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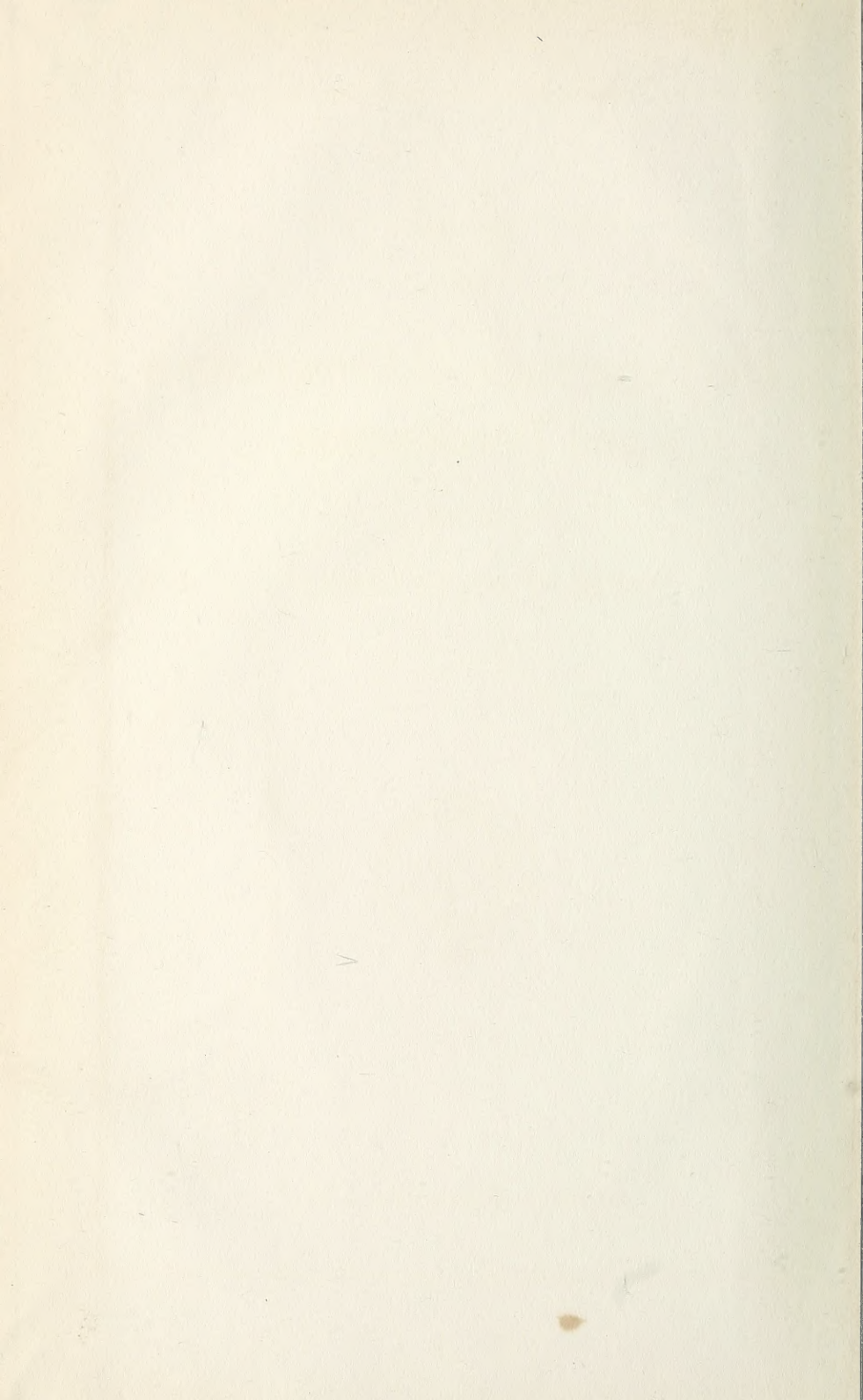
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FOURTH BIENNIAL REPORT
OF
The Department of Conservation
and Development
OF THE
STATE OF NORTH CAROLINA



BIENNIUM ENDING JUNE 30, 1932

THE PEOPLE OF NORTH CAROLINA
AND THE
RESOURCES AND INDUSTRIES OF NORTH CAROLINA

THE LEGISLATURE

THE GOVERNOR

THE CONSERVATION BOARD

THE DIRECTOR

BOOKKEEPING AND ACCOUNTING

BUDGET

RULES AND REGULATIONS

ADMINISTRATION

PERSONNEL

INFORMATION SERVICE

COMMERCIAL FISHERIES

FISHERIES COMMISSIONER

REGULATIONS
PATROL SERVICE
STATISTICAL RECORDS
LICENSE COLLECTIONS
SCIENTIFIC STUDIES
SHELLFISH SANITATION
FISH PROPAGATION
DEVELOPING MARKETS
OYSTER CULTURE

COMMERCE AND INDUSTRY

ASSISTANT TO THE DIRECTOR

NEW INDUSTRIES
STATISTICAL SERVICE
CENSUS ENUMERATIONS
TRADE HELPS
TRAFFIC STUDIES
RADIO PROGRAMS
DEPARTMENT PUBLICATION
SPECIAL ARTICLES
EDUCATIONAL PROGRAM
STATISTICAL FILES
INFORMATION SERVICE

FORESTRY

STATE FORESTER

FOREST PROTECTION
COUNTY COOPERATION
FIRE SUPPRESSION
LAW ENFORCEMENT
REFORESTATION
FOREST NURSERIES
ROADSIDE BEAUTY
FORESTRY EDUCATION
FOREST UTILIZATION
FORESTRY INFORMATION
STATE PARKS
STATE FORESTS

GAME

STATE GAME WARDEN

LAW ENFORCEMENT
GAME FARMS
STATE REFUGES
AUXILIARY REFUGES
PURCHASE OF GAME
INTERPRETATION OF LAWS
USE OF PRESS
USE OF RADIO
MOTION PICTURES
LECTURES
PUBLICATIONS

INLAND FISHERIES

ASSISTANT DIRECTOR

LICENSE SERVICE
FISH HATCHERIES
LAW ENFORCEMENT
FISH CULTURE
FISH RECLAMATION
EDUCATION
REGULATIONS
REARING PONDS

MINERAL RESOURCES

STATE GEOLOGIST

MINERAL IDENTIFICATION
MINERAL INVESTIGATION
MINERAL STATISTICS
GEOLOGIC MAPPING
WELL LOCATIONS
REPORTS

WATER RESOURCES
AND ENGINEERING

CHIEF ENGINEER

STREAM GAGING
POWER INVESTIGATIONS
HYDROLOGIC INVESTIGATIONS
COASTS, PORTS & WATERWAYS
STREAM POLLUTION STUDIES
WATER ANALYSIS
DRAINAGE DISTRICTS
UNDERGROUND WATERS
MAPPING AND SURVEYING
STATE HYDRAULIC ENG'G.
FISHWAYS AND DAMS

COOPERATION WITH OTHER STATE AGENCIES
AND FEDERAL GOVERNMENT

FOURTH BIENNIAL REPORT
OF
THE DEPARTMENT OF CONSERVATION
AND DEVELOPMENT
OF THE
STATE OF NORTH CAROLINA

FOR THE BIENNIUM ENDING JUNE 30, 1932

BOARD OF CONSERVATION AND DEVELOPMENT

| | |
|--|---------------|
| GOVERNOR O. MAX GARDNER, Chairman..... | Raleigh |
| S. WADE MARR, Vice Chairman..... | Raleigh |
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| LEE B. WEATHERS..... | Shelby |

J. W. HARRELSON, Director.....Raleigh

LETTER OF TRANSMITTAL

Raleigh, N. C.,
October 1, 1932.

To His Excellency, HON. O. MAX GARDNER,
Governor of North Carolina.

Sir:

Pursuant to Section 11, Chapter 122, Public Laws of 1925, and by direction of the Board of Conservation and Development, I have the honor to submit herewith the Fourth Report of the Department of Conservation and Development for the biennium ending June 30, 1932.

This report shows: the progress, nature and cost of the work done by the Department during the period July 1, 1930,—June 30, 1932.

Respectfully submitted,

J. W. HARRELSON,
Director.

DEPARTMENT PERSONNEL AND PRINCIPAL OFFICERS

ADMINISTRATIVE

J. W. HARRELSON, *Director*
R. N. SANFORD, *Principal Accounting Clerk*
MRS. ETOYAL P. HOBBS, *Fiscal Clerk*
GLADYS PRITCHETT, *Purchasing Agent*
FRANCES POPE, *Stenographer*

DIVISION OF COMMERCIAL FISHERIES

CAPT. JOHN A. NELSON, *Commissioner*
N. R. WEBB, *Fiscal Clerk*
VIRGINIA BROWN, *Stenographer*
G. L. ARTHUR, JR., *Assistant Sanitary Engineer (Resigned)*
THOS. M. RIDDICK, *Assistant Sanitary Engineer (Since June 1, 1932)*

Assistant Commissioners:

J. H. STONE, *Wilmington* E. O. SPENCER, *Swan Quarter*
L. A. QUIDLEY, *Manteo*

DIVISION OF COMMERCE AND INDUSTRY

PAUL KELLY, *Assistant to the Director, Chief*
BRYAN W. SIFE, *Statistician*
MRS. ELSIE P. DUNN, *Stenographer*

DIVISION OF FORESTRY

J. S. HOLMES, *State Forester*
CHAS. H. FLORY, *Assistant Forester*
F. H. CLARIDGE, *Assistant Forester*
GRACE WHITE, *Accounting Clerk-Stenographer*
MRS. ELSIE H. EASON, *Stenographer*
MABEL DUKE, *Stenographer*
ANNIE RAMSEY, *Stenographer*

District Foresters:

W. K. BEICHLER, *Asheville* L. A. CARTER, *Windsor*
W. A. PETERSON, *Fayetteville* WM. L. NOTHSTEIN, *New Bern*

DIVISION OF GAME

CHAS. H. ENGLAND, *State Game Warden*
C. L. BEDDINGFIELD, *Chief License Clerk*
MRS. ALICE W. AUSTELL, *Stenographer*
MRS. LILLIAN BRICKHOUSE, *Clerk*

Assistant State Wardens:

J. A. BRADSHAW, Asheville CHAS. J. MOORE, Washington
FRED D. WILLIAMS, Fayetteville W. C. LISK, Richfield

DIVISION OF INLAND FISHERIES

J. S. HARGETT, *Assistant Director, Commissioner*
CHRISTINE POLLOCK, *Stenographer*

Hatchery Superintendents:

Morrison Hatchery, FRANK J. REIGER, Balsam
Frank Stedman Hatchery, Fayetteville
"Pete" Murphy Hatchery, FRANK S. DYSART, Marion
Boone Hatchery, C. E. SMATHERS, Boone
Roaring Gap Hatchery, WM. R. SKAGGS, Roaring Gap

DIVISION OF MINERAL RESOURCES

H. J. BRYSON, *State Geologist*
GLADYS PRITCHETT, *Stenographer*

DIVISION OF WATER RESOURCES AND ENGINEERING

THORNDIKE SAVILLE, *Chief Engineer**
CHAS. E. RAY, JR., *Principal Assistant Engineer*
JAMES P. CLAWSON, *Assistant Engineer*
W. H. RILEY, *Assistant Engineer*
ESTELLE FULLER DONNELLY, *Senior Stenographer*
LAURETTA SHEPARD MCGEE, *Junior Stenographer*

PERSONNEL OF THE U. S. GEOLOGICAL SURVEY, NORTH CAROLINA DISTRICT, COOPERATING WITH THE STATE IN STREAM GAGING AND ALLIED WORK

E. D. BURCHARD, *District Engineer*
MRS. EFFIE T. WORKMAN, *Statistician-Clerk*
R. E. CABELL, *Junior Engineer*
H. A. TAYLOR, *Junior Engineer*
A. G. HELY, *Junior Engineer*

* Mr. Saville, who has occupied the position of Chief Engineer since the establishment of the Division in 1920, has resigned effective September 1, 1932, and will be succeeded by Chas. E. Ray, Jr.

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REPORT OF THE DIRECTOR

The following brief report of the Director contains information in general relative to the natural resources of North Carolina. A full report of the activities of the Department is contained in the reports of the several Divisions.

The administrative details are shown in a diagram in the first part of this report.

NATURAL RESOURCES

The conservationist's plea today is for an awakened public conscience toward those resources which are the fundamental source of much of our wealth. A manifestation of sound business principles requires the same serious consideration of future income as economy in expenditures. Common sense dictates that we should build up our reserves with a zeal equal to that applied toward expenditures of our operating capital. If we are to carry out a sound principle of this type, we should accompany our demand for economy with more definite policies looking toward the development of our natural resources and thus create, as near as possible, a depression-proof structure for the future.

A public interest in natural resources equal to that now shown in tax reduction will put into action a force that will make it possible to increase the income of North Carolinians to the extent of at least one hundred millions of dollars annually, a sum greater than the combined taxes of State and local governments each year. Taxes become burdensome largely in proportion to the ability of the public to pay. No attempt is made to refute the idea that taxes are too high, but rather to offer a suggestion of one method by which the burden may be made lighter.

Such a program does not necessarily involve increased governmental functions, but it does place more squarely up to the average citizen his duty to coöperate in the conservation of natural resources. After all, practical conservation is largely an educational program designed to create in the minds of the people the necessity of obtaining the most service from the fundamental gifts of nature. A policy of this kind seeks to guide the people in dealing with their natural resources in order that they may be of maximum benefit. In other words, it involves a quickening of public conscience toward conservation and the application of common sense and scientific information toward this purpose, realizing that all the people have a share in their returns and are common stockholders. This can be accomplished by requiring that a course in conservation and development of the natural resources be given in the public schools.

North Carolina is most fortunate from the standpoint of land qualities, variety of topography, climate and quality of water. Within the State are all grades of land from the sandy loam, easily cultivated, to hard rocky land suitable for grazing. Excellent farm lands are found at all elevations from a few feet above sea level to altitudes of over five thousand feet. Within the State the temperature ranges from an average of 64 degrees for

the southeast to 49.4 degrees for the northwest. The average maximum and minimum temperatures are 95 degrees and 13 degrees; and 85 degrees and —13 degrees, respectively, for these two points. The average time between killing frosts for these two points is 8 months 8 days and 4 months 28 days, respectively. There are few crops and plants produced on the earth within the temperate zone that will not grow in North Carolina.

Our State, consisting of 31,193,600 acres, is located on the earth so as to have every climatic advantage that favors any area of the same size and general shape in North America. Yet, because of our failure to adopt a land utilization policy suitable to the soil and climate, we are not deriving for the citizens and State the maximum benefits from our land.

Toward our natural resources we often pursue a policy as limited in view as that of a farmer who year after year grows crops without using any form of fertilizer or soil builder—ultimately destruction through impoverishment.

The natural resources of any state belong to the people of that State. Your Department of Conservation and Development keeps that one point ever in mind and conducts to the limit of laws and available funds a program of conservation, development, and wise use of the natural resources for the masses. North Carolina produces at present only a small fraction of the wealth in timber, fish, and game that the lands and waters will produce. Returns from the possible increase of these resources will accrue chiefly to the landowners but will spread their benefits to all the people. Our rich mineral deposits are relatively untouched due to lack of surveys to determine quantity, quality, and location. During the current depression, North Carolina could have been made one of the richest States in the Union through the development of forests and the mining of gold if it had been possible to utilize the idle labor which wanted little more than a bare subsistence, a contribution which some subdivision of the State was forced to make in many cases.

COMMERCIAL FISHERIES

The various forms of water products have always been among the chief foods of man. Modern science has proved that seafood contributes more of the elements vital to human health and life than the majority of other substances classified as foods. Our own Duke University is joining the groups of experimenters in the field of seafood.

Today the commercial fishing industry is prostrate. The Fisheries Commissioner states: "Another thing that has injured the industry has been truck competition. The regular legitimate fish dealer has been swept to the wall because of hard times and trucks. . . . Unscrupulous truck drivers have in a majority of cases been wholly to blame for illicit trade in oysters."

The total value of all water products for two years, ending June 30, 1932, dropped to \$4,293,396.80 of which only \$210,425 represents the value of oyster harvests. Only 12,000 acres, less than one-tenth of one per cent, of our 1,250,000 acres of potential oyster bottoms are today productive. It is known that one large Eastern concern has netted more than \$40 per year from thousands of acres of its oyster bottoms. The situation will never improve in North Carolina under the present lease laws.

Tens of millions of dollars annually will come from proper development of our water areas. Maryland and Virginia, with no greater natural advantage than North Carolina, are capturing the southeastern seafood markets through strict laws and regulations. Maryland crab meat production increased from 29,000,000 pounds in 1927 to 68,000,000 in 1931 as a result of stricter laws than we have in North Carolina.

Our 3,600 square miles of inland waters of the State constitute a veritable empire of wealth yet undeveloped. Development of water products depends upon four things: (1) a banding together of those engaged in the fishing industry, (2) changing laws on oystering to encourage the development of the leased areas, (3) higher cull limits on oysters and crabs, and (4) higher and better regulated marketing standards.

COMMERCE AND INDUSTRY

Authority for the creation of this Division is found in what is known as the "Conservation Laws," adopted by the General Assembly of 1925 in establishing the Department of Conservation and Development. The Department was directed "by investigation, recommendation and publication to aid in promoting the development of commerce and industry; and in coordinating existing scientific investigations." Further to the Department was assigned the duty "to collect and classify the facts from such investigations and from other agencies of the State as a source of information easily accessible to citizens of the State and to the public generally, setting forth the natural economic, industrial and commercial advantages of the State."

Experience has shown that the location of an industry frequently depends upon the availability of definite basic facts. In more than one case, North Carolina has lost manufacturing establishments that would have increased the wealth of the State by millions of dollars and have furnished thousands with employment because data were lacking to show that conditions for such plants were equally as attractive here as in neighboring States.

Many calls are received from Chambers of Commerce, business establishments, and manufacturers looking for suitable locations for plants, and from hundreds of tourists in search of interesting trips and vacation centers. Our output of mills reached the value of \$1,311,000,000 in 1929, of which \$687,179,151 was the value added by the manufacturing processes. This shows that the State is rapidly tending to an industrial State. Our investigations lead us to believe that the Department should: (1) be equipped with an industrial engineer to assist new and established industries; (2) be authorized to make a fuller study of the causes of industrial migration; (3) have available complete analyses of the waters of the State.

FORESTRY

Sound forestry management, with emphasis on control of fire, is a fundamental phase of conservation. Forests are renewable and will yield a continuous crop, if properly handled; but will be exhausted unless protected from destruction.

Of North Carolina's total land area of 31,193,600 acres, some 20,586,000 acres, or approximately two-thirds, are classed as forest land. Fire and

destructive logging have reduced approximately 2,500,000 acres to idleness and about 1,500,000 acres to only partial productiveness.

The primary objective of the State's forestry program is to bring into full productivity all lands suitable for timber growing and not used for other purposes. Such a goal cannot be reached until fire is successfully controlled.

Over a period of two decades, the average damage by fire to the forests of North Carolina has been about \$1,000,000 annually. One of the worst seasons ever experienced was 1931 when losses from forest fires amounted to \$4,786,225, with 1,722,369 acres being burned over.

The report of the Division of Forestry demonstrates strikingly the value of organized forest fire protection. With adequate funds available, National Forest lands in North Carolina showed in 1931 a burned over area of only about 4/10 of one per cent; areas protected by the State with inadequate funds had 4.12 per cent burned over; and 11.27 per cent of unprotected forest lands burned.

Of the total funds available for forest fire protection during the fiscal year, 1932-33 amounting to \$102,513, only \$4,740 will be from direct State appropriations, the remainder will be provided by the counties, private owners, game fund, and the Federal Government. The Federal Government will furnish \$51,609 of the total.

Direct losses in wealth to the State do not constitute the sole nor perhaps the most important damages of forest fires. Intangible but nevertheless real injurious effects of the ravages of fire deserve most thoughtful concern. Forests, to a large extent, influence the regular flow of streams by absorbing moisture and releasing it to feed our water courses during periods of drought; they are the reservoirs of raw materials for industries; they are the homes, feeding places and breeding grounds for game; and they constitute an esthetic appeal bringing thousands of visitors and forming the recreational grounds for the people.

If our forests are to be saved and their services perpetuated, a full measure of their usefulness must be realized and proper steps taken for their preservation. Groups, nations, and races of peoples decline in power, mental and physical vigor with the dissipation of the natural resources of the lands inhabited by said peoples.

GAME

Within historic times, three species of birds and three—perhaps four—mammals native to North Carolina have become extinct. The three birds that have disappeared forever are the great ivory-billed woodpecker, the Carolina paroquet, and the passenger pigeon. No longer do the buffalo, elk, and panther, with the exception of a few survivors protected in the State and Federal refuges, roam our woods. The beaver may no longer be found in the State, the last of these animals recorded being reported years ago.

Other species of wild life had decreased to the danger point before the passage of the State Game Law, which furnishes an effective means of protecting these creatures.

The progress of civilization has limited the range and reduced the ability of game to escape the skill and snares of man. Improved firearms, quick

transportation, and reduced areas of wild land have given man increased advantage and wild life less chance. Game laws represent man's efforts to perpetuate useful animal life. These regulations seek to curtail the vicious practice of the game hog and to even the opportunity of hunting for the average citizen.

Game has a definite economic value. Hides and flesh of wild life taken annually in North Carolina are worth in the neighborhood of \$4,000,000, which could easily be increased to double or more through full coöperation of the public in the State's game program.

Aside from the value of hides and flesh, the money brought into the community or State is a contribution worthy of consideration. A careful study reveals that at least \$50,000 is annually brought into one county, Chatham, by non-resident hunters. A large part of this goes into tax payments for the farmers of the county.

Those who cannot see beyond the flesh and fur, however, have failed in a proper appreciation of wild life. The esthetic appeal and the social contribution of birds and animals make a community a more pleasant place in which to live. The joy of an excursion afield, whether with dog and gun or to observe and study the creatures of Nature, makes for a fuller and happier life for thousands of our citizens.

Without the faithful and tireless assistance of song and insectivorous birds, ornithologists tell us, hordes of destructive insects would hamper or probably make the growth of crops impossible.

Game laws seek only to restrain a tendency on the part of some to destroy needlessly or beyond a reasonable limit, to rehabilitate our wild life resources for service to all through reasonable regulations and constructive measures, and to spread the benefits to every citizen of the State.

INLAND FISHERIES

"The sole object of dedicating the fisheries resources of North Carolina to the greatest service to the largest number motivated the adoption of the regulations governing fishing. Any restrictions on the free use of this resource is intended only for the purpose of preventing wasteful destruction of a common inheritance, in which every citizen of the State has a definite property interest, by a few who would deprive the majority of their share in their benefits."

The above quoted from page 91 of this report expresses the policy governing our efforts to develop the fish resources as well as the other resources.

Through the depression we have kept all hatcheries going at full capacity while many other states have not been so fortunate. Interest is increasing in sport fishing. "Days off" are increasing for office, shop and factory workers and the State is obligated to provide entertainment during these days if it controls by law the hours worked.

Development of inland fishing will be limited as long as the State is (1) without a law which prohibits all forms of fishing during the breeding season, and (2) permits any form of seining or trapping unless specifically authorized in exceptional cases where control is necessary.

MINERALS

The development of the State's mineral resources fares no better than does that of our other natural resources. From 289 species and sub-species we realize an annual income of only thirteen millions of dollars. Reports by competent engineers and geologists for the former North Carolina Geological and Economic Survey show that North Carolina has the largest feldspar, sheet mica, residual kaolin clay, kyanite, corundum, monazite, tin, mica schist, pyrophyllite, spinel, garnet and granite deposits in the United States. Yet of this group of twelve minerals, only five are produced at the present time. In addition to the above, there are also large deposits of limestone, marble, marl; coal, both bituminous and anthracite; magnetic iron ore, sand and gravel, brick and tile clays, barite, talc, soapstone, and copper which have commercial possibilities. Also there occur several varieties of gem stones, some gold, lead and zinc, which offer possibilities. The idea that "North Carolina is Nature's Sample Case" is erroneous.

Development of the vast mineral wealth depends upon the ability of the State to furnish prospectors with accurate and adequate information concerning her deposits. Under the surface within North Carolina are millions upon millions of dollars worth of gold and on the surface is enough idle man power to mine the gold. It is no exaggeration to say that under the soil of North Carolina there is a mineral wealth equal to our public debt. Development of these riches which belong to landowners, awaits a mineral survey of the State.

WATER RESOURCES

Water in all ages has been the major contribution to material progress. In the past transportation depended largely upon water; and today it is the indispensable factor to industry and urban civilization. Quality and quantity of water will govern future development in North Carolina. Although imminent, (but the public is not convinced) the next serious problem of this State will be water supplies. For this reason our surveys should be expanded. Droughts, stream pollution, and the lowering of the ground water level will soon be serious and the State records should be continuous and complete. The migration of industries, the establishment of new plants and power development, steam as well as hydro-electric, are governed largely by water supplies. Water supplies, taxes, and power rates will influence future industrial development more than our salubrious climate, raw materials, or much heralded labor supply.

STATEMENT OF RECEIPTS AND DISBURSEMENTS
Biennium 1930-1932

| | 1930-31 | 1931-32 |
|---|--------------|--------------|
| I. ADMINISTRATION: | | |
| Salary, Director..... | \$ 6,000.00 | \$ 5,200.00 |
| Salaries, Staff..... | 10,251.65 | 8,827.50 |
| Office Supplies..... | 593.62 | 351.54 |
| Postage, Telephone, Freight, etc..... | 1,639.60 | 775.11 |
| Travel Expense..... | 1,604.03 | 811.51 |
| Printing and Binding..... | 3,062.61 | 1,294.91 |
| Repairs..... | 50.30 | 47.01 |
| General Expense..... | 1,597.23 | 927.75 |
| Equipment..... | 304.05 | 95.00 |
| Total Expenditures..... | \$ 25,103.14 | \$ 18,330.33 |
| Less Receipts: | | |
| Sale of Publications..... | 661.00 | 60.68 |
| Appropriation..... | \$ 24,442.14 | \$ 18,269.65 |
| II. WATER RESOURCES: | | |
| Salaries and Wages..... | \$ 13,910.58 | \$ 11,302.06 |
| Supplies and Materials..... | 518.04 | 381.14 |
| Postage, Telephone, Freight, etc..... | 570.93 | 317.83 |
| Travel Expense..... | 2,287.41 | 1,163.40 |
| Printing and Binding..... | 392.61 | 289.82 |
| Motor Vehicle Operation..... | 573.51 | 532.89 |
| Repairs..... | 129.39 | 57.40 |
| General Expense..... | 46.80 | 66.00 |
| Coöperation with U. S. Geological Survey..... | 10,440.55 | 8,371.30 |
| Coöperation with Beach Erosion Board..... | | 315.20 |
| Equipment..... | 1,370.08 | 149.58 |
| Fair Exhibits..... | 33.30 | |
| Total Expenditures..... | \$ 30,273.20 | \$ 22,946.62 |
| Less Receipts..... | 3,633.99 | 3,185.93 |
| Appropriation..... | \$ 26,639.21 | \$ 19,760.69 |
| III. MINERAL RESOURCES: | | |
| Salaries and Wages..... | \$ 5,220.00 | \$ 4,522.00 |
| Office Supplies..... | 85.91 | 52.38 |
| Postage and Telephone..... | 46.21 | 59.28 |
| Travel Expense..... | 1,112.88 | 1,363.89 |
| Printing and Binding..... | 10.21 | 6.98 |
| Equipment..... | 17.10 | |
| Appropriation..... | \$ 6,492.31 | \$ 6,004.53 |
| IV. FORESTRY | | |
| <i>Forest Fire Prevention:</i> | | |
| Salaries and Wages..... | \$ 35,787.34 | \$ 30,044.99 |
| Workman's Compensation..... | 1,724.75 | 884.14 |
| Supplies and Materials..... | 845.18 | 208.20 |
| Postage, Telephone and Freight..... | 1,864.03 | 1,518.26 |
| Travel Expense..... | 7,112.20 | 6,130.40 |
| Printing and Binding..... | 1,177.76 | 494.12 |
| Motor Vehicle Operation..... | 3,408.71 | 2,697.19 |
| Lights..... | 24.57 | 27.69 |
| Repairs..... | 135.15 | 119.74 |
| General Expense..... | 1,333.91 | 1,060.19 |

STATEMENT OF RECEIPTS AND DISBURSEMENTS—Continued
Biennium 1930-1932

| | 1930-31 | 1931-32 |
|---------------------------------------|------------------|------------------|
| IV. FORESTRY—Continued | | |
| Equipment..... | \$ 2,492.93 | \$ 897.48 |
| <i>Coöperative Projects:</i> | | |
| Salaries, Wardens..... | 21,723.80 | 19,608.49 |
| Salaries, Fire Fighters..... | 30,100.26 | 27,325.14 |
| Travel Expense..... | 3,978.71 | 2,516.99 |
| Lookout Towers..... | 2,881.98 | 2,323.12 |
| Telephone Lines..... | 2,222.89 | 991.39 |
| Fire Fighting Equipment..... | 3,457.73 | 1,130.02 |
| Equipment Repairs..... | | 972.16 |
| Cabins and Buildings..... | | 239.20 |
| Total Forest Fire Prevention..... | \$120,271.90 | \$ 99,188.91 |
| Less Receipts: | | |
| Federal Coöperation..... | 49,272.09 | 55,481.42 |
| County Coöperation..... | 25,952.64 | 20,192.49 |
| Private Coöperation..... | 4,016.88 | 4,236.21 |
| Allotted from Game Fund*..... | 42,020.00 | 16,141.10* |
| Total Receipts..... | \$121,261.61 | \$ 96,051.22 |
| Appropriation..... | \$ 989.71 | \$ 3,137.69 |
| <i>General Forestry:</i> | | |
| Salaries and Wages..... | \$ 3,370.42 | \$ 4,535.50 |
| Supplies and Materials..... | 256.88 | 57.27 |
| Postage, Telephone, Freight, etc..... | 163.54 | 161.69 |
| Travel Expense..... | 455.83 | 296.49 |
| Printing and Binding..... | 188.90 | 39.08 |
| Motor Vehicle Operation..... | 48.43 | |
| Equipment..... | 78.63 | |
| General Expense..... | 30.00 | |
| Total General Forestry..... | \$ 4,592.63 | \$ 5,090.03 |
| <i>Parks:</i> | | |
| Salaries and Wages..... | \$ 3,014.30 | \$ 1,754.50 |
| Supplies and Materials..... | 25.15 | 28.50 |
| Postage, Telephone, Freight, etc..... | 35.13 | 4.29 |
| Travel Expense..... | 86.68 | 134.67 |
| Printing and Binding..... | 54.80 | 12.12 |
| Motor Vehicle Operation..... | 59.46 | 72.07 |
| Insurance, Fire..... | 55.07 | |
| Building Repairs..... | | 43.72 |
| Total Parks..... | \$ 3,330.59 | \$ 2,049.87 |
| <i>Planting:</i> | | |
| Salaries and Wages..... | \$ 7,109.44 | \$ 5,725.59 |
| Supplies and Materials..... | 603.45 | 582.49 |
| Postage, Telephone, Freight, etc..... | 220.06 | 103.17 |
| Travel Expense..... | 48.42 | 52.90 |
| Printing and Binding..... | 26.40 | 2.70 |
| Motor Vehicle Operation..... | 357.74 | 298.60 |

* Sec. 5, Ch. 232, 1931

STATEMENT OF RECEIPTS AND DISBURSEMENTS—Continued
Biennium 1930-1932

| | 1930-31 | 1931-32 |
|---|--------------|--------------|
| IV. FORESTRY—Continued | | |
| Equipment..... | \$ 16.50 | \$ 6.01 |
| Insurance, Fire..... | 10.30 | |
| Total Planting..... | \$ 8,392.31 | \$ 6,776.36 |
| Total General Forestry, Parks and Planting..... | \$ 16,315.53 | \$ 13,916.36 |
| Less Receipts: | | |
| Federal Coöperation..... | 1,828.75 | 2,541.87 |
| Private Coöperation..... | | 10.50 |
| Sale of Seed and Seedlings..... | 399.53 | 809.94 |
| Sale of Publications..... | 41.66 | 46.25 |
| Permits, State Lakes..... | 178.34 | 324.55 |
| Park Concessions..... | 417.70 | 263.77 |
| Total Receipts..... | \$ 2,865.97 | \$ 3,996.88 |
| Appropriation..... | \$ 13,449.56 | \$ 9,919.48 |
| VII. INLAND FISHERIES: | | |
| Salary, Assistant Director..... | \$ 4,500.00 | \$ 3,950.00 |
| Salaries, Staff..... | 4,545.50 | 2,123.33 |
| Supplies and Materials..... | 206.91 | 54.94 |
| Postage, Telephone, Freight, etc..... | 204.89 | 145.85 |
| Travel Expense..... | 173.77 | 279.45 |
| Printing and Binding..... | 1,154.14 | 694.16 |
| General Expense..... | 127.12 | 71.75 |
| Bonding Officials..... | 13.52 | |
| Commissions to Wardens..... | | 1,240.59 |
| Total Administration..... | \$ 10,925.85 | \$ 8,560.07 |
| <i>Morrison Hatchery:</i> | | |
| Salaries and Wages..... | \$ 4,191.00 | \$ 3,292.00 |
| Supplies and Materials..... | 2,336.28 | 1,374.13 |
| Postage, Telephone, Freight, etc..... | 98.66 | 89.11 |
| Travel Expense..... | 22.65 | 3.03 |
| Motor Vehicle Operation..... | 186.37 | 180.09 |
| Lights..... | 125.10 | 75.56 |
| Repairs..... | 70.81 | 55.96 |
| Equipment..... | 272.15 | 43.47 |
| Insurance, Fire..... | 62.50 | |
| Total Morrison Hatchery..... | \$ 7,365.55 | \$ 5,113.35 |
| <i>Pete Murphy Hatchery:</i> | | |
| Salaries and Wages..... | \$ 2,480.80 | \$ 2,048.00 |
| Supplies and Materials..... | 1,234.47 | 1,172.38 |
| Postage, Telephone, Freight, etc..... | 16.53 | 2.00 |
| Motor Vehicle Operation..... | 187.21 | 154.30 |
| Repairs..... | 161.31 | 201.50 |
| Equipment..... | 9.89 | 6.15 |
| Insurance, Fire..... | 52.63 | |
| Total Pete Murphy Hatchery..... | \$ 4,142.75 | \$ 3,584.33 |

STATEMENT OF RECEIPTS AND DISBURSEMENTS—Continued
Biennium 1930-1932

| | 1930-31 | 1931-32 |
|--|--------------|--------------|
| VII. INLAND FISHERIES—Continued | | |
| <i>Stedman Hatchery:</i> | | |
| Salaries and Wages..... | \$ 2,636.00 | \$ 1,220.00 |
| Supplies and Materials..... | 656.66 | 408.37 |
| Postage, Telephone, Freight..... | 135.66 | 84.27 |
| Travel Expense..... | 54.72 | 3.60 |
| Motor Vehicle Operation..... | 267.39 | 137.28 |
| Repairs..... | 113.94 | —88.81 |
| Equipment..... | 203.65 | —68.85 |
| Insurance, Fire..... | 124.00 | — |
| Total Stedman Hatchery..... | \$ 4,192.02 | \$ 1,695.86 |
| <i>Roaring Gap Hatchery:</i> | | |
| Salaries and Wages..... | \$ 2,455.00 | \$ 1,932.00 |
| Salaries and Materials..... | 1,249.75 | 1,272.89 |
| Postage, Telephone, Freight..... | 128.23 | .95 |
| Travel Expense..... | 150.71 | 23.52 |
| Motor Vehicle Operation..... | 366.18 | 298.11 |
| Repairs..... | 63.15 | 132.94 |
| Insurance, Fire..... | 48.40 | — |
| Power and Light..... | 76.57 | 71.30 |
| Total Roaring Gap Hatchery..... | \$ 4,537.99 | \$ 3,731.71 |
| <i>Boone Hatchery:</i> | | |
| Salaries and Wages..... | \$ 1,920.00 | \$ 1,731.50 |
| Supplies and Materials..... | 2,578.78 | 1,713.72 |
| Postage, Telephone, Freight, etc..... | 10.00 | 10.00 |
| Motor Vehicle Operation..... | 226.27 | 151.23 |
| Repairs..... | 137.26 | 41.81 |
| Equipment..... | 68.53 | — |
| Insurance, Fire..... | 60.45 | — |
| Total Boone Hatchery..... | \$ 5,101.29 | \$ 3,667.26 |
| <i>Lake James Hatchery:</i> | | |
| Salary, Keeper..... | \$ 315.00 | — |
| Supplies and Materials..... | 72.92 | \$ 7.73 |
| Total Lake James Hatchery..... | \$ 387.92 | \$ 7.73 |
| <i>Cooperative Projects:</i> | | |
| Coöperation, U. S. Bureau of Fisheries..... | \$ 429.09 | \$ 48.50 |
| Total Expenditures..... | \$ 37,082.46 | \$ 26,389.81 |
| Less Receipts: | | |
| Sale Anglers' Licenses..... | 37,680.88 | 29,473.17 |
| Balance carried forward to following year..... | \$ 598.42 | \$ 3,083.36 |

STATEMENT OF RECEIPTS AND DISBURSEMENTS—Continued
Biennium 1930-1932

| | 1930-31 | 1931-32 |
|--|--------------|--------------|
| VIII. GAME: | | |
| <i>Administration:</i> | | |
| Salary, State Game Warden..... | \$ 4,500.00 | \$ 3,950.00 |
| Salaries, Clerks and Stenographers..... | 8,596.00 | 7,482.00 |
| License Buttons..... | 4,106.51 | 3,099.08 |
| Supplies and Materials..... | 1,030.59 | 378.23 |
| Postage, Telephone, Freight, etc..... | 2,318.30 | 1,345.20 |
| Travel Expense..... | 1,365.43 | 1,725.75 |
| Printing Licenses, Forms, etc..... | 2,974.52 | 2,819.33 |
| Repairs, Office Equipment..... | 54.35 | 31.69 |
| Publicity Service—Notices..... | 563.00 | 569.05 |
| Bonding Officials and Wardens..... | 269.02 | 476.44 |
| General Expense..... | 310.48 | 130.00 |
| Office Equipment..... | 78.75 | 41.70 |
| Fair Exhibits..... | 487.00 | 67.92 |
| Survey of Game..... | 1,145.00 | ----- |
| Total Administration..... | \$ 27,798.95 | \$ 22,116.39 |
| <i>Field (Enforcement):</i> | | |
| Salaries, District Wardens..... | \$ 6,023.00 | \$ 5,600.00 |
| Field Travel..... | 4,471.28 | 3,368.16 |
| Salaries, County Wardens..... | 91,966.74 | 54,667.32 |
| Motor Vehicle Operation..... | 303.99 | 780.19 |
| Total Warden Service..... | \$102,765.01 | \$ 64,415.67 |
| <i>Propagation of Game:</i> | | |
| Game Farm: | | |
| Salaries..... | \$ 5,883.00 | \$ 4,864.12 |
| Feed and Supplies for Game..... | 5,418.00 | 3,290.48 |
| Postage, Telephone, Express and Freight..... | 164.00 | 151.56 |
| Travel Expense..... | 20.00 | ----- |
| Motor Vehicle Operation..... | 448.00 | 420.92 |
| Light, Power and Water..... | 219.00 | 179.27 |
| Repairs and Alterations..... | 669.00 | 187.94 |
| Total Game Farm..... | \$ 12,821.00 | \$ 9,094.29 |
| Refuges: | | |
| Salaries..... | \$ 14,386.00 | \$ 12,801.58 |
| Supplies, Signs, etc..... | 814.00 | 656.74 |
| Telephone, Freight, etc..... | 187.00 | 115.26 |
| Travel Expense..... | 428.00 | 418.01 |
| Motor Vehicle Operation..... | 372.00 | 786.80 |
| Rents..... | 345.00 | 275.00 |
| Repairs..... | 202.50 | 16.30 |
| Fire Fighting..... | 173.00 | 104.57 |
| Taxes..... | 617.00 | 351.95 |
| General Expenses..... | 408.57 | ----- |
| Total Refuges..... | \$ 17,933.07 | \$ 15,526.21 |
| Cabin, Mt. Mitchell..... | ----- | \$ 1,347.95 |
| Fences, Game Farm..... | \$ 4,350.00 | 102.50 |
| Fences, Refuges..... | 1,867.00 | ----- |

STATEMENT OF RECEIPTS AND DISBURSEMENTS—Continued
Biennium 1930-1932

| | 1930-31 | 1931-32 |
|---|--------------|--------------|
| VIII. GAME—Continued | | |
| Equipment, Farm..... | \$ 743.00 | \$ 55.08 |
| Wiring Refuges..... | 615.00 | 140.70 |
| Automobile, Field..... | 394.50 | 436.44 |
| Purchase of Game..... | 4,768.00 | 261.31 |
| Total Additions..... | \$ 12,737.50 | \$ 2,343.98 |
| Bounties on Predatory Wild Life..... | \$ 5,193.00 | \$ 2,735.40 |
| Total Expenditures..... | \$179,248.53 | \$116,231.94 |
| Add Contribution to Forest Fire Prevention..... | 42,020.00 | 16,141.10* |
| | \$221,268.53 | \$132,373.04 |
| Receipts from Hunting Licenses..... | 232,729.08 | 143,996.82 |
| Balance carried forward to following year..... | \$ 11,460.55 | \$ 11,623.78 |
| Purchase of Land, Nursery..... | | \$ 550.00 |
| Less Receipt (Brought Forward)..... | | 550.00 |
| Receipt for Purchase of Towers (Brought forward, not expended)..... | | 340.00 |
| Total Expenditures for Department..... | \$414,787.07 | \$303,558.50 |
| Less Receipts..... | 356,812.53 | 261,513.60 |
| Excess Expenditures over Receipts..... | \$ 57,974.54 | \$ 42,044.90 |
| Add Balances Forward: | | |
| Hunting Licenses..... | 11,460.55 | 11,623.78 |
| Fishing Licenses..... | 598.42 | 3,083.36 |
| Purchase of Land..... | 550.00 | |
| Purchase of Tower..... | 340.00 | |
| Total Balances..... | \$ 12,948.97 | \$ 14,707.14 |
| Expended from Appropriation..... | 70,923.51 | 56,752.04 |
| Appropriation..... | \$101,005.00 | \$ 80,800.00 |
| Deduct Expended..... | 70,923.51 | 56,752.04 |
| Unexpended from Appropriation..... | \$ 30,081.49 | \$ 24,047.96 |
| <i>Receipts by Sources:</i> | | |
| Balance Hunting Licenses brought forward from 1929-30..... | \$ 55,995.12 | \$ 11,460.55 |
| Balance Fishing Licenses brought forward from 1929-30..... | 1,126.13 | 598.42 |
| Sale of Publications—Administration..... | 661.00 | 60.68 |
| Private coöperation in Stream Studies..... | 3,633.99 | 3,185.93 |
| Federal Coöperation in Forest Fire Prevention..... | 49,272.09 | 55,481.42 |
| County Coöperation in Forest Fire Prevention..... | 25,952.64 | 20,192.49 |
| Private Coöperation in Forest Fire Prevention..... | 4,016.88 | 4,236.21 |
| Federal Coöperation in Forest Planting..... | 1,828.75 | 2,541.87 |
| Private Coöperation in Forest Planting..... | | 10.50 |
| Sale of Seed and Seedlings..... | 399.53 | 809.94 |

* Sec. 5, Ch 282, Public Laws of 1931.

STATEMENT OF RECEIPTS AND DISBURSEMENTS—Continued

Biennium 1930-1932

| | 1930-31 | 1931-32 |
|---------------------------------------|--------------|--------------|
| <i>Receipts by Sources—Continued</i> | | |
| Sale of Forest Publications..... | \$ 41.65 | \$ 46.25 |
| Permits, State Lakes..... | 178.34 | 324.55 |
| Park Concessions..... | 417.70 | 263.77 |
| Sale of Fishing Licenses..... | 36,554.75 | 28,874.75 |
| Sale of Hunting Licenses..... | 176,733.96 | 132,536.27 |
| Purchase of Land..... | | 550.00 |
| Purchase of Tower..... | | 340.00 |
| Total Receipts..... | \$356,812.53 | \$261,513.60 |
| <i>Expenditures by Object:</i> | | |
| Salaries and Wages..... | \$239,082.00 | \$177,573.99 |
| Supplies and Materials..... | 22,698.73 | 15,090.21 |
| Postage, Telephone, Freight, etc..... | 7,803.27 | 4,888.83 |
| Travel Expense..... | 19,395.08 | 15,774.78 |
| Printing and Binding..... | 9,052.96 | 5,653.22 |
| Motor Vehicle Operation..... | 6,803.97 | 6,509.67 |
| Light, Power and Water..... | 446.19 | 353.82 |
| Repairs and Alterations..... | 1,786.01 | 871.70 |
| General Expense..... | 16,631.93 | 12,221.57 |
| Current Obligations..... | 713.00 | 509.48 |
| Equipment..... | 6,211.09 | 1,691.26 |
| Forest Fire Control..... | 64,365.37 | 55,106.51 |
| Purchase of Game..... | 4,768.00 | 261.31 |
| Bounties..... | 5,193.00 | 2,735.40 |
| Extraordinary and Other..... | 9,836.47 | 2,238.55 |
| Additions and Betterments..... | | 2,078.20 |
| Total Expenditures..... | \$414,787.07 | \$303,558.50 |

The Financial Report of the Division of Commercial Fisheries is not included in above report, but follows the general report of that Division.

DIVISION OF COMMERCIAL FISHERIES

ORIGIN OF DIVISION

The General Assembly of 1909 appointed a committee consisting of the Speaker of the House, Lieutenant-Governor and twelve senators and representatives to make a tour of inspection throughout eastern North Carolina to determine the advisability of establishing a State-wide Fisheries Commission. The present Fisheries Commissioner had the pleasure of accompanying this committee on the patrol boat *Atlantic*, meeting the party at Edenton and taking the group to Manteo, Hatteras, Swan Quarter, Washington, Beaufort, New Bern, and Wilmington.

Previously the Legislature made laws from time to time governing the fishing industry, but this method of handling this important activity of the State had become so unsatisfactory that the Legislature sought a more satisfactory way. It was realized that the work was too important to wait two years between sessions of the General Assembly to fill the legislative needs of a seasonal nature. Obviously, closer supervision was needed. At that time the Fisheries Commission territory consisted of five northeastern counties, and the Shellfish Commission covered the whole State. The Shellfish Commission handled only shellfish, and the two Commissions were independent of each other.

In 1915, the advocates of the State-wide Fisheries Commission succeeded in their efforts to have a State-wide bill enacted. The law established a Fisheries Commission Board composed of five members appointed by the Governor. These men were chosen to represent the several fishing counties of the State with consideration being given to their familiarity with the fishing industry. The law gave the Board the power to make regulations governing the industry, and after such rules and regulations were passed by the Board and advertised in some newspaper for four consecutive weeks they were given equal force with an act of the Legislature. The law further required the Board to appoint a Fisheries Commissioner for the purpose of carrying out the fishing regulations and all laws pertaining to the fishing industry; and it also required the Fisheries Commissioner to appoint two Assistant Commissioners and as many inspectors as necessary to carry out the purposes of the act.

The Board, consisting of Ed. Chambers Smith, of Raleigh; A. V. Cobb, of Windsor; E. H. Freeman, of Wilmington; T. H. Winslow, of Hertford; and W. M. Webb, of Morehead City, held its first meeting at New Bern, and appointed Mr. Smith as Chairman and H. L. Gibbs as Fisheries Commissioner. Morehead City was decided upon as the permanent headquarters of the Commission.

The Board advertised meetings to be held at Edenton, Manteo, Morehead City, and Wilmington for the purpose of getting in touch with as large a number of people as possible in the different localities to the end that the needs and problems of the fishermen might be discovered and studied.

The mass of information assembled at these meetings served as a guide in passing certain needed regulations. In adopting these regulations, the Board kept in mind the fact that regulations ordinarily meant restrictions, and the Commission would be greatly hampered if the fishermen were hostile instead of coöperative. Hence it was seen at the very start that the Board would have to act very practically instead of ideally and that it should aim gradually to establish a constructive conservation and development program.

The first Commissioner, H. L. Gibbs, served until his death in April 1919, and was succeeded by J. K. Dixon, of Trenton. In December, 1920, J. A. Nelson, who had served as assistant Commissioner under previous Commissioners, was appointed to succeed Mr. Dixon, who resigned.

In March following the appointment of J. A. Nelson, the Commission instituted 75 prosecutions on charges of violations of the scallop regulations. The defendants were convicted in Superior Court presided over by Judge J. Floyd Horton, and later noted an appeal to the Supreme Court on the grounds that this Board did not possess authority to deprive a defendant of his liberty, as the violation of the regulations passed by the Board was a misdemeanor and carried a road sentence. The State was represented by Thos. W. Bickett, James S. Manning, Attorney General, and Frank Nash, Assistant Attorney General; defendants, by E. H. Gorham, C. R. Wheatley, O. H. Guion and Chas. L. Abernethy. The Supreme Court upheld the decision of the lower court, and in rendering his decision, Judge Hoke made the following statement:

"We have given the case most careful consideration, and owing to the very great importance of this industry to the State and its people, it is gratifying that a conviction can be upheld in accord with accepted principles and constitutional and statutory construction. It is a subject that has deservedly received the fullest consideration of our Legislature, and under the capable, courageous and impartial enforcement of the law that has prevailed for the past years, there is reason to believe that substantial and ever increasing benefits may be expected." This ruling gave emphasis to the fact that the Commission had full authority delegated to it by the Legislature to pass regulations of equal force with an act of the Legislature.

Governor Morrison took a great interest in the fishing industry as a whole, and succeeded in getting an appropriation of \$500,000 from the Legislature for the upbuilding of the important commercial fisheries industry and for building hatcheries for fresh water fish; for building a terrapin hatchery; for the planting of oysters, scallops and clams, for the digging of an inlet, and for any purpose that made for the improvement of the fishing industry. When this money was available, the Board immediately began a study, with the aid and advice of experts, preparatory to building the hatcheries and to carry out other purposes of the fishing industry as provided for by the Legislature. Five fish hatcheries and one terrapin hatchery were built; 1,500,000 bushels of oysters and shells were planted; and an inlet dug at old New Inlet near Chicamacomico. The fish hatcheries and oyster plantings have proved a great success and benefit to the State, but the inlet on account of adverse weather conditions closed up the winter after it was opened in October. If it had been possible to

have kept it open it would have been worth many times its cost, as it was one of the main inlets through which shad and herring entered the sounds, and was of great importance to the clam and oyster industry of that section.

Governor A. W. McLean was also greatly interested in our fishing industry, considering it one of the main industries of the State. During his administration the Legislature of 1927 consolidated the Fisheries Commission with the Department of Conservation and Development. Governor O. Max Gardner considers the commercial fisheries one of the important industries of the State and is quite as interested in the upbuilding of the industry as the Governors who preceded him. He believes the commercial fisheries vital to the coastal section as a means of support and to the State at large as a source of seafood supply.

Members of the Board past and present have consistently acted upon this principle and conviction, that the fisheries industry is one of the State's important basic industries and should, therefore, command the best judgment and service of those who have it in charge. It has in no small measure been due to the conscientious and loyal service of these men and of the personnel of the Division that our laws and regulations and our methods of enforcement hold such high rank with our Federal Bureau of Fisheries and with others who have visited us for the purpose of studying our activities.

ACTIVITIES OF THE DIVISION

An ever increasing value is being placed upon the fishing industry by those who have to do with the different store houses of nature. Even the most casual thinkers know that fish in their various forms have always been among the chief foods of man. Considering the increasing population of the earth and, therefore, the proportionate increase in the demand for water products, our almost unlimited food producing areas are beyond price. If these different areas throughout the world are protected adequately, one of the greatest sources of food supply will be saved for the use of future generations of consumers. These resources of the sea, sound and river, though gifts of nature should, nevertheless, be properly evaluated. Our Government has acted in a far-sighted manner to throw the might of its money and influence behind this basic industry, because obviously it would be suicidal to leave this great source of food supply at the mercy of chance or haphazard policy. The fish is not only a food, but one of our most valuable and wholesome foods. This fact, the Government has recognized, and is consequently, resolved to protect it.

Food Fish—Food fishing is done the year round everywhere in our State waters. Of course, there are closed seasons at different times and for different waters. But this phase of our industry is so extensive there are people engaged in it the whole year. Thousands depend upon it for a livelihood and their condition has been distressing during these last two years.

This biennium has witnessed an unusual situation. At times fish have been in our waters in large quantities, but no market could be found for them. The depression has been so general that our fishermen could not

hope to escape its ill effect. The prevailing prices for their produce have been the lowest for 25 years. Another thing that has injured the industry has been the truck competition. The regular legitimate fish dealer has been swept to the wall because of hard times and trucks. Many of them have been forced out of business, and unless some restriction is placed upon this form of competition the industry will be completely demoralized. As it is the business needs all the sympathy and help which can be given.

There is one bright spot in the situation for our local fishermen—the break through the beach at the New Inlet site caused by the storm last spring. The catch of shad was larger this past season than it has been in fifteen years, due, perhaps, to this inlet allowing the fish to come into our upper sounds in greater quantities. If the inlet remains open it is only reasonable to infer fish will come into our sounds, possibly in increasing numbers; and then as conditions swing back to normal, give the fishermen a greatly enhanced income.

Shrimp. The catch of shrimp for the first half of this biennium was greater by one-third than that of the whole previous two years. This occurred in the face of unfavorable market conditions. But the catch for the year 1930-31 was only a little better than 20 per cent of the previous year. This great drop in production was certainly due in a large measure to the forest fires during the whole shrimping season. The smoke was so dense for weeks on end in Brunswick County where the bulk of our shrimp are caught that the fishermen did not dare put out to sea. As a result the fishermen did not break even for their season's work.

During the two years 1928-30 the production of shrimp was 1,207,108 pounds valued at \$181,066.20, while this biennium the catch was 1,883,908 pounds valued at \$188,390.80, or an increase of 676,800 pounds. The increase in revenue to those engaged in the industry was only a few thousand dollars, due to a thirty-three and a third per cent drop in price.

Menhaden. The menhaden operators have been conducting their business under most unfavorable conditions. Their product is bringing less than it did fifty-four years ago when the first factory in the South was established at Beaufort, N. C., by C. P. Dey. They cannot contract for their oil, scrap and meal as they could only two or three years ago. No operator has any assurance as to what he will get for his output and for this reason alone the situation is discouraging. It is due only to the very low wage at the factory and the low price paid for fish that the strongest of the factories can operate part time. The wage scale is that of fifty years ago. Even then the operators are not sure that they are getting by with their expenses. Considering the amount of capital invested in the factories and boats, and the returns received from it, one is forced to recognize that the business is in a precarious condition. It would seem that only the strongest can survive. Three companies have gone into the hands of receivers within the past year. Still it would take very little improvement in the market to relieve the strain, because the output is in such great volume.

The price range for the menhaden products this biennium was about fifty per cent of that of the two years previous, while the catch of fish was

off about thirty per cent. A total of 171,500,000 menhaden were caught this period, which sold for \$761,500. From this total catch 857,500 gallons of oil were manufactured, valued at \$171,500, and scrap in the amount of 12,250 tons, valued at \$590,000 was manufactured. The investment in the industry is approximately \$500,000 in boats, \$50,000 in nets and equipment and in addition to this \$900,000 in factories.

Oysters. There has been a falling off in our production of oysters this biennium as compared with last biennium. This has not been due to the scarcity of oysters, but to unfavorable market conditions. We have, as a matter of fact, more oysters now than at any time during the past several years. We, no doubt, would have had a much greater demand for them if the depression had not been on, because of the increasing scarcity of oysters in Maryland and Virginia. However, the demand will increase as soon as general conditions improve. People have begun to look upon the oyster as possessing splendid food qualities. It contains as great nutritive substance as milk and meat and is more easily digested. The State Board of Health has assigned a full time engineer to take charge of shellfish sanitation work. All oysters and clams must be approved before they are shipped, to see that the product is in a sanitary condition when placed on the market.

The people were beginning to take a greater interest in private oyster cultivation before the depression became so acute. We are having a number of inquiries from interested parties and are leasing some bottom all the while. When the funds are available we are sure that a good many citizens will apply for lease of oyster ground. To encourage this work, the Board of Conservation and Development passed a resolution making oyster ground rent free for three years. Doubtless many people will take advantage of this offer. We have a million acres of oyster bottoms and only about twelve thousand acres producing oysters in commercial quantities. Authorities on the subject believe that our oyster grounds are as good as any in America.

Our production of oysters for this biennium was 526,062 bushels as compared with 792,704 bushels for the previous period. As stated elsewhere, this drop in production of 266,642 bushels was due almost altogether to lack of market. There was no shortage of oysters.

Clams. It has been estimated that one adult clam two years of age and about two and a half inches from hinge to mouth, at spawning will throw out two million eggs. On the face of it, it would seem that there could never be any danger of depletion, but such is not the case, because it, like all other branches of the fishing industry has its enemies. Only a small per cent of the eggs actually produce clams, and even when the shell is put on natural enemies prey upon it. But enough eggs mature to make the clam industry of great importance in several of our counties. Especially during these years of depressed markets for fin fish, the fishermen with their wives and children have been able to get their daily subsistence clamming when they could not have got it otherwise. The price has not been so low in twenty-five years. Clams are now selling locally at forty cents a bushel. Even at that price they mean meat and bread to many families. All the equipment necessary to catch clams are a rake

and bucket. This fact enables the poorest of our citizens to go clamming.

If there had been any market many more clams would have been shipped this biennium that last. The clams were here and the people were anxious to sell them even at greatly reduced prices. As it was, only 70,261 bushels were shipped, as against 81,856 bushels during the previous biennium.

Escallops. Escalloping in the past has been one of our important industries, but during this biennium it has been almost a failure. In addition to the decreased production the economic conditions have cut to a minimum the returns to the fishermen. Whereas, escallops used to bring two or three dollars a gallon, the past season they sold as low as fifty cents per gallon, which was less than the cost of production.

This industry is confined to Carteret County, chiefly in Bogue Sound. Escallops grow on grassy bottoms and most of the grass along our coast for some unknown reason has been killed out this year, and therefore, the outlook for the coming season is the poorest it has ever been.

There were 67,759 gallons of escallops sold this last biennium valued at \$67,759, while the product for the previous two years was 108,585 gallons valued at \$217,182, a decline in revenue from this source of \$149,423.

Escallop Control and Shellfish Sanitation. Regardless of adverse conditions as they have been related to marketing of shellfish, the sanitary handling of the same has steadily improved.

During the past season a strong policy was adopted and carried out against illicit shucking and selling of oysters. The result was that this type of business which had probably amounted to ten or twelve per cent was reduced to about one or two per cent, and sections which had been hard to get lined up went about building proper places to work in. Unscrupulous truck drivers have in a majority of cases been wholly to blame for illicit trade in oysters.

A sanitary survey of the waters north of Morehead City was made last January to establish a new line for taking clams. The survey showed that valuable clam areas could be used and that the old line of survey had taken in too much territory.

Although there have been soaking activities in the scallop industry, the quality of escallops shipped from the State has been better for the past two years than at any time in its history. No doubt this condition was brought about by good coöperation on the part of the buyers who refused to purchase escallops which had been washed by the catchers. Escallops had to be brought to market in their slime. This caused a few flares of soaking in the shell and made escallops adulterated with water hard to detect by sight or physical means. Close inspections and surveys of producing grounds coupled with chemical analysis of natural waters and escallops from these waters and also from producers' boats quickly ended this illegal practice. The short time in which soaking was carried on produced a court trial and this had a very salutary effect on subsequent operations.

G. L. ARTHUR, JR.

Assistant Sanitary Engineer, Shellfish Sanitation.

Soft Shell Crabs. This industry is confined to Carteret County and for the months of March and April it is the means of livelihood for many families. During these months North Carolina enjoys a monopoly on the crab market, because Virginia and Maryland do not open their seasons until May first. After this time we have no market, because the crabs are so much cheaper in Virginia and Maryland, due to their great abundance

and because they are so much nearer to the markets. This industry has held up better than any of the others. The production being 162,775 dozens valued at \$162,775 as against 81,204 dozens at \$101,505 in the previous period.

In addition to the soft shell crab industry we have two crab meat factories at Belhaven, one at Manteo, one at Vandemere and one at Morehead City. These factories have proved a great help to the fishermen, especially in Pamlico, Carteret, Beaufort and Dare counties. The products of these factories have fallen off greatly in price. Whereas, the meat formerly sold at one dollar a pound, recently it has been bringing fifty cents and less. The crab meat output of 175,000 gallons sold for only \$87,000.

Diamond Back Terrapins. Several years ago this industry was threatened with extinction. This fact induced the Department to enter into a coöperative agreement with the Federal Government to propagate the animals in captivity at the Beaufort biological station. Under the arrangement the Department provided the brood stock, food and a helper at the laboratory, while the U. S. Bureau of Fisheries was to furnish the services of a specialist. This arrangement has worked out profitably to the State of North Carolina, as all the terrapins raised are distributed in the State. Many thousands of terrapins (as high as 10,000) a year have been liberated in our waters annually. These numbers would have been much greater if the walls of two pens containing brood stock had not been crushed in by the storm of October, 1929, allowing the terrapins to escape. This was very unfortunate as the funds were not available to replace the adult stock. Even if the money had been available, the loss still would have been great, because an adult wild terrapin in captivity will not become good brood stock under two or three years. However, we feel the industry has been saved to the State by the three-fold efforts to replenish the supply of terrapins through protection by closed season during the laying period; through protection by inspection throughout the year; and by liberation of the young animals.

Patrol Boats. Since submitting our last report the patrol boat *Capt. John A. Nelson*, the largest of the patrol fleet, was lost. The boat was on the ways when the shipyard was burned. The State, knowing the need of a boat of the type of the *Nelson*, purchased another 65 feet long, 16 feet wide and powered with two 75 h.p. Cummins Deisel engines. This boat is used by the Division in the general supervision of the industry in the sounds and is stationed at Ocrocoke from November 1st to March 15th for special duty in the ocean to keep non-resident trawlers outside the three mile limit. Forty or fifty of these trawlers come down from Massachusetts, New York, New Jersey and Virginia to fish along our coast during the winter months. Without the protection the patrol gives them, the local fishermen would have their means of livelihood taken from them. To keep the industry from being destroyed, the feeding grounds of the fish around the upper inlets must be safeguarded. During the rest of the year the boat *John A. Nelson* is stationed at Morehead City. The speed boat *Roanoke* is also located at Morehead City, and is used to patrol Bogue and Core sounds, Newport River, especially the restricted areas around

Morehead City and Beaufort. The *Pamlico*, stationed at Swan Quarter, is used by one of the Assistant Commissioners for patrol work in Pamlico Sound, Neuse and Pamlico rivers. Her work is mainly to enforce the oyster law during the open season. The *Albemarle*, stationed at Manteo, is used by another Assistant Commissioner in marking off fishing limits in Chowan River, Albemarle Sound and the upper end of Pamlico Sound, and in collecting licenses and enforcing fishing laws. The *Croatan*, stationed at Manteo also, is a companion boat to the *Albemarle* and is used by the crew of the latter when needed. The *Chowan*, stationed at Edenton, is manned by an inspector, who looks after the enforcement of the fishing laws and collects licenses in the Chowan, Cashie and Roanoke rivers and in Albemarle Sound as far down as Alligator River. Without this patrol service the fishing industry in North Carolina would be hopelessly handicapped.

KIND, QUANTITY AND VALUE OF FISH TAKEN IN WATERS OF NORTH CAROLINA
For the Period July 1, 1930, to June 30, 1932

| Kinds of Fish | No. of Pounds | Value |
|------------------------------|---------------|-----------------|
| Trout..... | 8,235,000 | \$ 411,750.00 |
| Sea Mullet..... | 1,060,000 | 31,800.00 |
| Blue Fish..... | 1,016,000 | 50,800.00 |
| Mullet..... | 2,115,000 | 105,750.00 |
| Croakers..... | 15,232,000 | 304,640.00 |
| Spots..... | 3,053,000 | 91,590.00 |
| Hogfish..... | 417,000 | 12,510.00 |
| Mackerel..... | 403,000 | 40,300.00 |
| Shad..... | 4,036,000 | 807,200.00 |
| Herring..... | 20,219,000 | 404,380.00 |
| Butters..... | 934,000 | 46,700.00 |
| Carp..... | 916,000 | 54,960.00 |
| Flounders..... | 804,000 | 40,200.00 |
| Rock..... | 1,005,000 | 100,500.00 |
| Drum..... | 304,000 | 12,160.00 |
| Perch..... | 903,000 | 54,180.00 |
| Assorted..... | 1,011,000 | 40,440.00 |
| Cats..... | 522,000 | 41,760.00 |
| Eels..... | 75,000 | 2,250.00 |
| Jack..... | 452,000 | 27,120.00 |
| Pike..... | 30,000 | 2,400.00 |
| Bass..... | 131,800 | 15,816.00 |
| Pompano..... | 11,000 | 1,320.00 |
| Sea Bass..... | 517,000 | 41,360.00 |
| Sturgeon..... | 12,000 | 2,400.00 |
| Sheephead..... | 5,000 | 500.00 |
| Total Food Fish..... | 63,418,800 | \$ 2,744,786.00 |
| Shrimp..... | 1,883,908 | 188,390.80 |
| Menhaden (No. of Fish)..... | 171,500,000 | 761,500.00 |
| Total Value of Fin Fish..... | | \$ 3,694,676.80 |

SHELLFISH

| | | |
|-----------------------|------------------------|---------------|
| Oysters..... | 526,062 (Bushels)..... | \$ 210,425.00 |
| Clams..... | 70,261 "..... | 70,261.00 |
| Escallops..... | 67,759 (Gallons)..... | 67,759.00 |
| Soft Shell Crabs..... | 162,775 (Dozens)..... | 162,775.00 |
| Crab Meat..... | 175,000 (Pounds)..... | 87,500.00 |

Total Value Shellfish..... \$ 598,720.00

TOTALS

| | |
|-------------------------|-----------------|
| Value of Fin Fish..... | \$ 3,694,676.80 |
| Value of Shellfish..... | 598,720.00 |

Total Value Water Products..... \$ 4,293,396.80

STATEMENT OF RECEIPTS AND DISBURSEMENTS OF THE DIVISION OF COMMERCIAL
FISHERIES, DEPARTMENT OF CONSERVATION AND DEVELOPMENT

For Biennium 1930-31—1931-32

| | 1930-31 | 1931-32 |
|---|--------------|--------------|
| ADMINISTRATION AND INSPECTION: | | |
| Commissioner's Salary..... | \$ 4,200.00 | \$ 3,620.00 |
| Assistant Commissioners and Inspectors..... | 16,283.50 | 8,751.28 |
| Office Staff..... | 3,900.00 | 2,958.00 |
| Office Supplies..... | 460.00 | 205.88 |
| Postage and Box Rent..... | 155.81 | 128.09 |
| Telephone and Telegrams..... | 344.19 | 198.60 |
| Traveling Expenses Commissioners..... | 1,632.93 | 451.30 |
| Printing and Binding..... | 499.57 | 393.57 |
| Motor Vehicle Operation..... | 3,198.14 | 2,066.13 |
| Office Rent..... | 1,000.00 | 1,000.00 |
| Counsel Fees..... | 350.00 | 250.00 |
| Insurance and Bonding..... | 76.50 | 92.67 |
| Equipment..... | 99.25 | |
| Other Expenses..... | 878.91 | 307.35 |
| Buick Auto—(Trade difference paid)..... | 630.00 | |
| Total..... | \$ 33,708.80 | \$ 20,422.85 |
| PATROL BOATS: | | |
| Salaries and Wages..... | \$ 3,673.10 | \$ 2,948.00 |
| Supplies..... | 1,639.32 | 1,891.50 |
| Gas and Oils..... | 2,258.77 | 1,046.66 |
| Repairs..... | 1,792.89 | 3,853.02 |
| Equipment..... | 120.97 | 398.08 |
| Subsistence..... | 2,438.16 | 1,454.50 |
| Docks and Warehouses..... | 299.57 | 229.20 |
| Marking Fishing Limits..... | 496.55 | 435.04 |
| Fire Insurance on Boat, John A. Nelson..... | | 130.00 |
| Total..... | \$ 12,719.33 | \$ 12,386.00 |

STATEMENT OF RECEIPTS AND DISBURSEMENTS OF THE DIVISION OF COMMERCIAL
FISHERIES, DEPARTMENT OF CONSERVATION AND DEVELOPMENT—Continued
For Biennium 1930-31—1931-32

| | 1930-31 | 1931-32 |
|---|--------------|--------------|
| SHELLFISH SANITATION: | | |
| Salaries and Wages..... | \$ 1,000.00 | \$ 757.00 |
| Supplies and Materials..... | 43.20 | 42.43 |
| Traveling Expenses..... | 26.50 | 20.80 |
| Equipment..... | | |
| Total..... | \$ 1,069.70 | \$ 820.23 |
| TERRAPIN HATCHERY: | | |
| Salaries and Wages..... | \$ 450.00 | |
| Supplies and Materials..... | | \$ 341.19 |
| Total..... | \$ 450.00 | \$ 341.19 |
| Total Expenditures..... | \$ 47,947.83 | \$ 33,970.27 |
| Less Receipts..... | 48,009.39 | 27,518.15 |
| Credit Balance..... | \$ 61.56 | \$ 6,452.12 |
| Owe Contingency and Emergency Fund..... | | 6,452.12 |
| RECEIPTS: | | |
| Food Fish Licenses and Taxes..... | \$ 14,754.35 | \$ 6,530.17 |
| Oyster Licenses and Taxes..... | 15,576.34 | 9,681.13 |
| Escallop Licenses and Taxes..... | 3,390.70 | 1,103.25 |
| Clam Licenses and Taxes..... | 3,862.84 | 2,209.50 |
| Crab Licenses and Taxes..... | 2,583.31 | 2,151.05 |
| Menhaden Licenses..... | 6,015.00 | 3,777.50 |
| Power Boat Licenses..... | 445.00 | 552.50 |
| Other Sources..... | 1,381.85 | 1,513.05 |
| Total..... | \$ 48,009.39 | \$ 27,518.15 |

DIVISION OF COMMERCE AND INDUSTRY

SKETCH OF DIVISION

Progressive leaders of North Carolina for years have felt the need of an agency prepared to represent the State in general matters involving her progress and growth, particularly along industrial lines. Such a medium was provided with the establishment of the Division of Commerce and Industry of the Department of Conservation and Development in 1927.

Authority for the creation of this Division is found in what is known as the "Conservation Laws," adopted by the General Assembly of 1925 in establishing the Department of Conservation and Development. The Department was directed "by investigation, recommendation and publication to aid in promoting the development of commerce and industry; and in co-ordinating existing scientific investigations." Further, the Department was assigned the duty "to collect and classify the facts from such investigations and from other agencies of the State as a source of information easily accessible to citizens of the State and to the public generally, setting forth the natural economic, industrial and commercial advantages of the State."

The Division of Commerce and Industry was created by Director Wade H. Phillips, with the advice of the Board of Conservation and Development in July, 1927; and the late Park Mathewson, widely known economist of New York City, was selected to head the work.

Although the Division was launched with a definite program, it soon became a general service organization for the various Departments and political subdivisions of the State, for local trade bodies, and for the general public. Calls for coöperation and the natural expansion of its field have made it necessary for the Division to perform such a variety of services that it is impossible to give a detailed account of its activities without going into burdensome details. For that reason, this report will be confined to a mere outline of some of the services; but a somewhat more detailed description of the important functions will be given.

The first undertaking by the Division under the direction of Mr. Mathewson was a survey of the resources and industries of North Carolina which was published in a volume under the title of "North Carolina Resources and Industries." This publication has had wide distribution and is still in demand. Owing to the large expense involved in publishing, it was found necessary to set a fixed charge of \$1.10 and 60 cents for bound and unbound copies, respectively. During the last biennium this price has been cut in half.

This survey was an inventory of the natural resources and industries of the State; and was designed to furnish basic information for the further exploitation of the raw materials of North Carolina. The volume carries numerous charts, graphs, and figures to show the status of resources and industries. Among the subjects on which information was tabulated were minerals, agriculture, industries, water resources and power, water products,

resorts and recreational facilities, communications; population, labor and wages; wealth and taxes, and opportunities in industry.

The publication carries maps of all of the one hundred counties of the State with a summary of resources and industries of each. Demand for this class of information has made the publication a reference book for colleges, schools and libraries.

Another outstanding project carried out by the Division immediately after the completion of the survey of raw materials and industries was a study of flow of goods. The purpose of this inquiry was to determine the value and quality of raw materials and partly processed goods purchased outside of the State for use in manufacturing processes.

By means of this survey it was found that raw materials and partly processed goods to the value of \$49,032,523 were purchased outside North Carolina by 532 of the 2,984 manufacturing plants operating in the State in 1927. Much of this material could be obtained within the State. The primary object of the inquiry was to increase the outlets for all classes of commodities available within the State. Copies of the survey, setting forth total purchases of materials obtained elsewhere, were furnished to manufacturers in an attempt to bring the North Carolina manufacturer into closer contact with sources of materials within the State and to encourage further processing of raw materials and unfinished goods.

Under direction of Mr. Mathewson, the Division became the second State agency to take a biennial census of manufactures for the U. S. Department of Commerce. Because of financial limitations, however, this arrangement was carried out only for the year 1927.

BIENNIAL ACTIVITIES

Shortly before the beginning of the present biennium, Mr. Mathewson's services were lost through his death. Because of the close relationship of the duties of the two Divisions, Director J. W. Harrelson merged the Division of Public Relations, headed by Paul Kelly, with the Division of Commerce and Industry. Mr. Kelly was made Chief of the consolidated Division; and Bryan W. Sipe was appointed Statistician.

By means of the merger, the fact-finding and fact-collecting agency was combined with the agency responsible for the dissemination of the facts. The Division, with these two groups of duties, can coordinate more closely the work of acquiring and making public data and information. There has been, as a result of the merger, no slackening of the educational program of the Department as a whole and of the various Divisions.

The Division of Commerce and Industry operates entirely from funds appropriated for administrative purposes. It would undoubtedly add to the effectiveness of its operation and promote a definiteness that is now lacking, if direct provisions were made for the work of the Division. Under existing provisions, it is difficult to map out in advance a program of activities; and, therefore, a degree of efficiency is sacrificed.

Broadly, the operations of the Division may be summed up under four general headings as follows: I—Educational; II—Statistical; III—Promotional; and IV—Miscellaneous. This report will deal with each of these general classifications in order:

I. Educational: Since every phase of the Department's activities involves contact with the public, and since the degree of success attained depends largely on the support received, the educational work stands out in importance. The Division of Commerce and Industry is the clearing house for information pertaining to the work of the entire Department. Through this medium, the Department seeks to arouse public interest in the resources which serve the needs of the people and to make available helpful information developed through study, experience, and observation.

Press: Information compiled and facts derived through studies and research carried on by the various agencies of the Department and coöperating institutions are useless unless applied. They cannot be applied unless the public is informed of their existence. The daily and weekly press provide an essential medium for this and other types of contact.

Close contact is maintained by the Division, on behalf of the entire Department, with representatives of the press, which has coöperated fully in bringing the materials furnished to public attention. The Division is called upon frequently for special articles, photographs, and cuts which will set forth and illustrate various features of the Department's operations.

In addition, efforts are made to supply periodicals of various types with articles and information. Such have been furnished to publications throughout the country during the biennium, including large dailies in metropolitan centers, the *North Carolina Teacher*, the *Virginia-Carolina Retailer*, *Manufacturers Record*, the *Carolinas Magazine*, the *Wachovia*, and numerous others.

Data and information upon which scores of other articles have been based have been furnished by the Division. In many cases these data were supplemented by photographs collected by the Division or taken by members of the Department's staff.

Radio: Development of radio has furnished an additional means of reaching the ear of the public. The Division is responsible for the Department's schedule of radio talks. Beginning approximately four years ago, a regular schedule of broadcasts has been carried out as an educational medium, seeking to create public interest in conservation and to enlist support in efforts to apply the resources of the State to the wisest possible use.

Two weekly periods have been filled over Station WPTF during the entire biennium, with the exception of the last few months. One of these was devoted to general departmental subjects with every division given a place on the schedule; and the other was filled by speakers from the Division of Commerce and Industry. The two periods were suspended toward the close of the biennium when a special program under the title of "Advancing With North Carolina," was instituted in coöperation with Station WPTF. Leaders in various fields in the State have been enlisted as speakers. This feature will be continued for a time, and when the program is completed the Department will resume its regular schedule.

On special occasions such as "Carolina Forest Week" and "Made-in-North Carolina Week," daily and tri-weekly talks have been sponsored by the Division. These have not only been broadcast by the Raleigh station, but by all eight of the stations of the State.

A new service inaugurated during the biennium was a series of bulletins throughout the day during the period of high hazards from forest fires. These bulletins, announced at frequent intervals, warned the people of the consequences of handling fires carelessly while the woods were in a highly inflammable condition. All of the North Carolina radio stations coöperated in this feature, and hundreds of thousands of people were reached as a result.

In addition to broadcasts sponsored and made by the Department personnel, the Division of Commerce and Industry furnished material for a number of feature programs over some of the nation's broadcasting networks and individual stations to advertise the State. Speakers were also furnished materials for miscellaneous talks.

Recreational Advertisements: For the past several years, the Division has conducted each fall a campaign to present the hunting and fishing facilities of the State to hunters and fishermen throughout the nation. A schedule of display advertisements is run immediately preceding each hunting season in the nation's leading sports publication. Copy for these displays is prepared by the Division.

Photographs: Although the Division is fully cognizant of the value of pictures in any educational campaign, it has so far been unable to develop this medium to any extent. During the biennium, however, scores of photographs have been collected and distributed to publications and agencies for the purpose of advertising the State.

This service has been limited to those pictures which could be obtained from other sources without cost and those which are taken by the personnel of the Department. One of the greatest needs of the Division is a file of negatives of outstanding views representative of various phases of life and attractions of North Carolina. Often requests for photographs cannot be met because suitable scenes are not available to the Division, and valuable advertising is lost to the State.

Motion pictures can be used to distinct advantage in every phase of the Department's program, and this field should be developed as rapidly as possible. Conservation can be taught to certain groups more effectively through this medium than any other and many persons that cannot be reached by other means can be impressed by use of motion pictures.

II. Statistical: This is the fact-finding and analyzing phase of the Division's activity. Data compiled are used by the Division itself and are assembled on request from various organizations, agencies and individuals.

Experience has shown that the location of an industry frequently depends upon the availability of definite basic facts. In more than one case, North Carolina has lost manufacturing establishments that would have increased the wealth of the State by millions of dollars and have furnished thousands with employment because data were lacking to show that conditions for such plants were equally as attractive here as in neighboring States.

One of the main tasks of the Division of Commerce and Industry is to assemble such an array of information as will furnish incontrovertible facts in regard to the many phases of the State's life. The Division is constantly engaged in assembling such pertinent facts so as to have them ready for any call.

As the Division assembles information regarding the State and her attractions, the public is informed of its availability; and as a result calls are constantly received. The Division has become a clearing house for general statistical information regarding the State, requests often being received from other agencies and Departments. Many calls are received from Chambers of Commerce, business establishments, manufacturers looking for suitable locations for plants, and from hundreds of tourists in search of interesting trips and vacation centers.

A beginning in the compilation of records concerning the State was made with the establishment of the Division; and during the past two years these have been greatly expanded. Major subjects under which file material has been assembled are:

a—Detailed lists of manufacturing plants of the several classes in North Carolina, such as cloth mills, yarn mills, hosiery plants, furniture mills, tobacco factories, food processing plants, wearing apparel manufactures, and others have been issued in mimeograph form.

b—A commodity index was begun. A card file showing all the various products made in the State and the names of the producer is being developed so that inquiries as to where a given article might be purchased can be readily answered. This is an attempt to be of service to the manufacturer and merchant by bringing them together.

c—Data files have been set up for each of the States, all North Carolina counties, and the principal cities of the State. These data are part of the general service available to trade promotion bureaus, merchants, manufacturers, tourists, and students.

III. Promotional Activities: Statistics and facts are ineffective unless put to constructive use. Even though numerous requests come to the Division for facts that have been collected and classified, its officials are not content merely to serve by supplying these data. They seek to induce residents of North Carolina and of other States to act upon conclusions drawn from their statistical and research work.

The Division's program to use the data compiled by its fact-finding activities is featured by a series of what has been termed "campaigns," divided into two general classes; first, to promote the welfare of manufacturing plants and merchandising establishments already in the State; and second, to encourage the establishment of new plants. The aim of this latter group of activities has been to secure plants best fitted to conditions obtaining in the State—mainly plants which would tend to diversify manufacturing. Principal projects under these heads are as follows:

"Made-in-North Carolina" Campaigns: The primary objective of this project is to popularize North Carolina-made products and thereby to increase their distribution. Major emphasis in this program has been placed on displays and sales of goods made in the State by home stores with particular emphasis being devoted to this feature during a special week known as "Made-in-North Carolina Week."

By starting at home to acquaint North Carolinians with the products of their State, it is believed that the movement will spread and accomplish cumulative results. Such a program is intended to give the public a better

idea of the varieties and qualities of the many articles manufactured in the State. A better appreciation of home industries will stimulate business for the merchant and manufacturer by encouraging buying of their products not only by North Carolina merchants but by large organizations with branch stores in the State.

While it is often difficult to trace specific results of such a movement, there are tangible evidences that it has rendered definite service along the lines contemplated. Probably the most lasting effect of the program has been the mental impression upon the public and merchandising agencies. Large and small buyers are showing that they are becoming more conscious of the wide variety and fine quality of North Carolina-made articles.

Three of the Nation's largest retailing organizations have shown their interest in Tar Heel products by advertising that during a single year, they have purchased goods made in the State worth, respectively: \$21,000,000, \$7,000,000, and \$6,000,000. A Greensboro hosiery mill advertised that it had landed a \$75,000 order through the efforts of one of the merchants featuring North Carolina-made goods. A merchant made to think in terms of home-produced goods requested his manufacturer to establish a branch plant in the State; and as a result a plant for the manufacture of night clothing was brought to North Carolina.

Some evidences of the effects of the "Made-in-North Carolina" program are furnished in the following communications received from merchants and other interested sources—

One merchant wrote: "We have had a very fine crowd in the store today who are not only inspecting the fine products which are made in North Carolina, but who are actually buying them."

Another said: "There is no doubt that there is real economy in buying at home. We may not see the effects for some time to come but savings in transportation costs must surely bring about lower prices on home products."

A merchandise broker wrote: "I am writing to inquire where I can get in touch with mills in this State which would be in a position to make baby blankets in lots of one thousand or more."

The program has brought out many ideas which have been passed on to the merchant and manufacturer. Among the suggestions made by merchants were that manufacturers should follow styles and color combinations more closely, producing as nearly as possible what the public wants; co-operative advertising by manufacturers; finishing of more goods; and a great variety of others. These suggestions were made in a constructive spirit with a true desire to serve the interests of North Carolina manufacturers. They were summed up and placed in the hands of manufacturers.

Various phases of the "Made-in-North Carolina" program expanded the movement to reach thousands of persons throughout the State. Among the associated angles of the movement were:

a—Use of a North Carolina label. Millions of North Carolina-made articles find their way into markets of the world. Some method of identifying these goods with the State would be an effective means of advertising the State and its products. The Division has advocated for several years the use of labels on North Carolina products to show the State as their origin. An

interested firm has already suggested a design, and a contest for the purpose of selecting a suitable label for general use would bring the movement effectively to the attention of manufacturers and the general public. At a relatively small cost, this project could be carried out. Its value to the State would be tremendous.

b—Study Outlines for Women's Clubs—Considerable interest has been aroused among the women by means of this outline. Its primary aim was to arouse the interest of women in buying North Carolina-made goods and to furnish suggestions which might be followed in studying the State's industrial organization. Some of the clubs sponsored fashion shows at the conclusion of their studies and many individuals made dresses of home-made goods.

c—Study Outline for Public School Teachers—This outline furnished the basis for numerous projects, used as supplementary material in history and geography. Home economics teachers also found it useful in projects for their work. The outlines also provided the foundations, in cases, for more thorough studies of the industries, their importance to the State, and possibilities for future development.

Garment Making: Studies of the industrial situation in North Carolina have led the Division to believe that garment making is one of the most logical fields for further expansion of manufacturing in the State; and emphasis has been given to this field. As a step to encourage such a development, the Division has prepared a list of kinds of cloths manufactured in the State and the type of garments for which each is suited. Information regarding the type of garments in greatest demand and the size of the market in the State, has also been compiled and distributed. These suggestions were made to encourage the establishment of those classes of plants which have promise of successful operation.

Food Processing Plants: As a supplement to the "Live-at-Home" program sponsored by Governor O. Max Gardner and as a means of further diversifying industry in the State, the Division has extended its efforts to encourage the establishment of food processing plants. The project has sought not only to enlist North Carolinians in developing this phase of industry but direct contact has been made with firms operating elsewhere with the suggestion that new and branch plants be established in North Carolina.

North Carolina Gifts for Christmas: Two campaigns with the idea of promoting the sale of North Carolina-made things for gifts at this season have been promoted. The motivating idea has been to direct public attention to products of the State as suitable presents for relatives and friends. Sentimental considerations make the effects of this manner of advertising doubly significant.

That the consolidated effect of these campaigns has been constructive and that they resulted in tangible results is evident. The Division does not claim credit for the establishment of new plants, but it has definite reasons to believe that it has had a part in causing the people to think seriously about further diversification of industry. More garment making and food processing plants were established in proportion to the total of new indus-

tries during the last two years than in any similar previous period. A partial summary lists the following as having been established in 1931:

| Class of Plant | Number of | |
|----------------------------------|-----------|-----------------|
| | New | Expan- sions |
| Hosiery | 12 | 27 |
| Textiles other than hosiery..... | 15 | 19 |
| Clothing | 5 | 3 |
| Food | 28 | 3 |
| Stone (Bldg., Monumental)..... | 3 | 2 |
| Chemicals, drugs, etc. | 7 | 1 |
| Furniture | 8 | 10 |
| Lumber and wood products..... | 5 | 2 |
| Ice plants | 2 | 2 |
| Mining Companies | 3 | |
| Brooms | 1 | |
| Cigars | 1 | |
| Fertilizer | 4 | |
| Laundries | 2 | |
| Oil mills | 1 | |
| Miscellaneous | 5 | |
| | 102 | 76 |

IV. Miscellaneous Activities: Having come generally to be known as a service agency, the Division of Commerce and Industry is called upon to perform a multitude of duties that cannot be covered in a report of this nature.

Advertising Tourist Attractions: This function is of such importance as to warrant its classification as a major promotional activity but owing to the limited means available for the purpose, it has been prosecuted on such a scale as to warrant its being mentioned only in the miscellaneous group.

Officials of the Division have consistently pointed out the soundness of a small investment in advertising North Carolina's scenic and historic attractions to the world. Millions of Americans search constantly for interesting places to visit, but North Carolina with scenery as beautiful as may be found in the Nation and with a background of history such as few States afford has done virtually nothing in a concerted way to reap the benefits of her attractions. As a consequence, the State has failed to draw hundreds of thousands of tourists who would come to the State if they were informed of the many things available for their admiration and pleasure.

No State-wide organization for the attraction of tourists or for the promotion of industry exists in North Carolina, with the exception of the Division of Commerce and Industry. This fact emphasizes the need for providing more adequate support for this work.

The Division has prepared material for a tourist guide but on account of the lack of funds has been unable to have it issued. This guide would indicate the position of leading historic and scenic attractions of North Carolina by means of an overlay on a State highway map, the back of which would carry brief descriptions of each point of interest. Information of this type is requested by hundreds of individuals throughout the

Nation each year, but without printing funds it can be supplied only in an inadequate and ineffective manner.

Facts About North Carolina: During the biennium the publication known as "Facts and Figures" was revised and issued under the new title, "Facts About North Carolina." This sheet gives a summary of outstanding facts about industry, agriculture, history, geography, and other outstanding information about the State. Since no facilities for printing the information were available, it has been mimeographed; but the heavy demands for this information have made it difficult to furnish the number requested.

Miscellaneous requests for information of widely varied nature occupy considerable time of the personnel of the Division. These requests are for information ranging from that readily available to that requiring considerable research to assemble. Standard data have been reduced to mimeograph form to facilitate reply to such inquiries.

The Division is called upon at frequent intervals to conduct special studies for data in behalf of projects designed to benefit the State. It has been called upon to represent the State in the preparation of briefs for such purposes as seeking the location of a Veterans Hospital in the State, attempting to bring certain industries to the State, and research in relation to the tax situation with reference to industry.

CONCLUSION

North Carolina's most important era of development has run virtually concurrently with the expansion of industry. New payrolls have created additional sources of income and manufacturing has brought new wealth to the State. Her future prosperity depends, to a great extent, upon the manner in which the people exploit the natural resources at their command.

Every State in the Nation is striving earnestly to promote industrial development within their borders, and those better equipped to meet the demand for basic information as to their suitability for such enterprises will be most successful. Since there is no agency in North Carolina to represent the State in this particular, except the Division of Commerce and Industry, it is particularly desirable that this organization be enabled to work effectively.

The importance of encouraging industrial development is illustrated by a comparison between the productiveness of manufacturing and agriculture, the latter still being the means of support of the largest group in the State in spite of the rapid growth of industry during the past three decades.

Census reports for 1930 show that a total of 499,923 North Carolinians were engaged in agricultural pursuits; and that 286,245 workers are employed in manufacturing and mechanical industries. A total of 1,141,129 workers are listed as being engaged in gainful occupations for a livelihood. In other words, 43 per cent more persons are engaged in agriculture than in industry. During the period between 1920 and 1930, the number of industrial workers increased by 75,223, or 84.5 per cent; and agricultural workers increased by 30,392, or 6.54 per cent.

A striking contrast is shown between the capacity of the two important pursuits to create wealth. Latest available statistics (the census of manufactures for 1929) reveal that the total value of output of industry in North

Carolina was \$1,311,000,000, of which \$687,179,151 was added to raw materials by manufacturing processes. For the same year the gross income from agriculture was \$257,000,000.

In spite of the great difference between the capacity of the two pursuits to produce income for the people, the State has spent only a negligible amount to promote industrial development.

This comparison is made not for the purpose of minimizing the usefulness of funds being spent for the benefit of agriculture, but to emphasize the wisdom of a larger investment to encourage new enterprises which will furnish additional outlets for farm products, add new payrolls and new sources of taxes. The extent to which the State's development may be promoted is in direct proportion to the means provided and the wisdom of their expenditure.

Education constitutes the keystone to success of the program of the Department. It should be carried out continuously to be most effective since a gap in the program will result in a loss of momentum which must again be put under way by redoubling efforts should the work be allowed to lapse. Progress of the Conservation program depends in the main upon the degree of public coöperation enlisted, and often upon the conversion of the individual from the old careless attitude toward the natural resources to one of realization of the necessity of wise use if these gifts of Nature are to serve to the maximum extent. The creation of such an attitude is a matter of education.

DIVISION OF FORESTRY

DEVELOPMENT OF FORESTRY PROGRAM

It was in 1860, eight years after the creation of the Geological Survey by the legislature and the appointment of Dr. Ebenezer Emmons as State Geologist, that the first important State report on the trees, shrubs and woody vines of North Carolina was published as Part III, "Botany, Geological and Natural History Survey of North Carolina." This was prepared by the Rev. M. A. Curtis, D.D., who supplemented it with the publishing in 1867 of a catalogue of the indigenous and naturalized plants of the State. The production of these two reports may be looked upon as the beginning of forestry investigation and education by this Department. In the preface to his book "Forestry in North Carolina" which Col. P. M. Hale published in 1883, he said of Dr. Curtis' "Woody Plants of North Carolina" which formed the greater part of this handbook: "The publication placed North Carolina among the foremost of the States in respect to the completeness as well as the scientific accuracy of the knowledge of her singular botanical wealth, which had engaged the interest and study of the most famous European and American Botanists for nearly one hundred years."

Dr. W. C. Kerr, who was appointed State Geologist on the death of Dr. Emmons in 1866 and died in 1885, published among other reports: "North Carolina, Containing General Description of the State and its Resources including Geology, Minerals, Soils, Forests and Mining."

In 1891 the legislature placed the Survey on a different footing upon the establishment of the North Carolina Geological Survey and the appointment of Dr. Joseph A. Holmes, Professor of Geology and Botany at the State University, as State Geologist. The object of this Survey as expressed in the act authorizing it was "the thorough examination of the nature and extent of the mineral and timber resources of the State." The most outstanding contribution of Dr. Holmes to conservation was his strong and effective fight for the establishment of reserved national forests in the Southern Appalachians. With the assistance of William W. Ashe, then just graduated from the University of North Carolina, and in one case assisted by Gifford Pinchot, the present Governor of Pennsylvania, several bulletins and reports on the forest resources of the State were prepared and published during the first few years of the existence of this Survey. The principal reports during this period were: "The Forests, Forest Lands and Forest Products of Eastern North Carolina," by W. W. Ashe, 1894; "The Timber Trees of North Carolina," by Gifford Pinchot and W. W. Ashe, 1897; "Forest Fires: Their Destructive Work, Causes and Prevention," by W. W. Ashe, 1895; "The Maple Sugar Industry in Western North Carolina," by W. W. Ashe, 1897. All of these reports were published from the point of view of the forester; namely, the development and use of our forest resources was urged while at the same time provision was made for their perpetuation. Ashe also assisted H. B. Ayres in the study of the Southern

Appalachian region and in reports to Congress of 1902 and 1905 which led to the enactment of the Weeks Law of 1911, starting the acquisition of land for eastern national forests.

Geological and Economic Survey. In 1905 the General Assembly re-organized the old Geological Survey, creating the North Carolina Geological and Economic Survey. The object of this Survey, as stated in the act creating it, included "An examination of the mineral, forest, fish and other material resources of the State." The paragraph relating to forestry states that "An examination and classification of the soils and the forests and other physical features of the State shall be made with special reference to their bearing upon the occupation of the people." Under this law Dr. Joseph Hyde Pratt who had been connected with the old Survey for several years was appointed State Geologist. In addition to the long established geological and mining activities, three new features of the Survey dealing with good roads, the fishing industries, and forestry, were organized. W. W. Ashe was appointed Forester. During the years 1905 to 1908 forestry investigations were continued by the Survey, but only a part of Ashe's time was occupied in the work. The diversity of his activities is shown in the publications which he prepared during this period, the chief of which were Bulletin 16, "Shade Trees in North Carolina;" Bulletin 17, "Terracing Farm Lands;" and Bulletin 24, "Loblolly or North Carolina Pine." He resigned as Forester in 1909 and threw in his lot permanently with the United States Forest Service.

Later Work of W. W. Ashe. In previous years Mr. Ashe had carried out a number of temporary assignments for this Bureau, but from then on was regularly employed by the federal government. First, as Forest Assistant, he was assigned to coöperative work with landowners, examining timber tracts and advising lumbermen in the handling of their forest properties. Later he became Secretary of the National Forest Reservation Commission and was attached to the office of acquisition as Forester Inspector and later as Assistant District Forester. His duties were to examine forest tracts and secure offers from the owners for areas to be added by purchase to the eastern national forests. In 1928, John E. Burch became Secretary of the Reservation Commission; and Ashe, with the title of Inspector, devoted his whole time to the more difficult duties of examining and appraising forest lands.

His untoward and lamented death after a brief illness in Washington, D. C., on March 18, 1932, has left a gap in American forestry which will be hard to fill. E. A. Sherman, Associate Forester of the United States Forest Service who had general supervision of Ashe's official activities, speaks in the highest terms of his services to the government in the valuation and purchase of forest lands for national forests. He says that he saved the government hundreds of thousands of dollars by the establishment of reasonable price levels for land. "His little leaflet entitled, 'Small Trees Wasteful to Cut for Saw Timber' doubtless saves the lumber industry annually throughout the country many times this amount, in addition to leaving the cutover lands in better condition for future timber crops." His services to North Carolina through the studies begun forty years ago and his publications on forestry, shade trees and soil erosion and especially his justly celebrated

monograph, "The Loblolly or North Carolina Pine" have established a precedent for thorough work which all other servants of the State would do well to follow.

Farm Forestry. Following the resignation of Mr. Ashe, J. S. Holmes, at that time Forest Examiner in the United States Forest Service, was appointed Forester in the Survey by Dr. Pratt, the Director. Mr. Holmes immediately sought coöperation with the federal government in a forest study of the State and this study was continued intermittently for several years finally covering the Western and Piedmont Regions with county-wide studies of their timber resources. The report on the former region was published as Bulletin No. 23, "Forest Conditions of Western North Carolina," while separate leaflets for each of the Piedmont counties were printed as press bulletins. This study continued through most of the summers to 1917 when federal coöperation in this project was withdrawn. Up to this time a large part of the time and efforts of the Forester had been devoted to interesting the farmers and other small landowners in better forestry practice. Lectures were given at farmers' institutes, examinations made of farm woodlands, articles written for publication with this in view. However, most of the direct touch with the farmers and county agents was relinquished in 1917 to the Farm Forester, now known as Extension Forester, by agreement with the Agricultural Extension Service.

Development of Forest Protection. The efforts begun by W. W. Ashe to secure suitable legislation for State prevention and suppression of forest fires were kept up steadily by offering bills at each session of the Legislature. Such a bill was finally enacted in 1915, but this carried no appropriation. Under it, however, some small coöperation was secured from the Federal Government and experimental and educational work was carried on until in 1921 a technical assistant to the State Forester, William D. Clark, was secured whose whole time could be devoted to fire prevention and organization work. This date, which can well be considered the beginning of forest administration in North Carolina, was some thirty years after the first forester employed by the State had advocated prevention of forest fires. From this time on the expansion of the forest fire prevention work to as large a part of the forest area of the State as possible has been the chief aim and interest of the Division of Forestry. Through the policy of coöperation with the counties on a fifty-fifty basis, the protected area was gradually increased until in 1930 approximately half the forest area of the State was under protection. This maximum has somewhat declined through the last biennium.

FOREST FIRE CONTROL

The present accomplishment in forest protection could not have been attained but for the liberal apportionment of Federal funds under coöperative agreements made possible by the Weeks and Clarke-McNary laws. With a beginning of \$2,000 for the payment of special forest wardens in 1916, the apportionment to North Carolina has increased to a maximum of \$56,000 in 1931. This money is used in part to match county appro-

priations and in part to pay a share of the cost of maintaining the forest protective organization throughout the State.

Following the death of W. D. Clark in 1923, Harry Lee Baker, now State Forester of Florida, was appointed Assistant State Forester in charge of fire prevention work in 1924. He resigned a year later and W. C. McCormick, a practical man with thorough training and experience, was appointed in his place. On the resignation of Mr. McCormick in 1928, Charles H. Flory, the incumbent, was promoted from District Forester to Assistant Forester in charge of this forest fire prevention work. With the spread of the work it became necessary to organize district offices and these have been administered by men with technical forestry training and several years experience. The six districts have, under stress of circumstances, been temporarily consolidated into four. The uncertainty of securing coöperation from the counties has made the administration of these districts one of the most difficult problems of the Department.

Present Organization. The organization of the Forest Fire Control branch of the Forestry Division is as follows:

The Assistant Forester is in charge of forest fire prevention and suppression work. Three central office assistants were employed in the first fiscal year and two during the second.

Five District Foresters served during the first fiscal year and four during the second year. These are technically trained men with practical experience who have charge of fire control activities in the six districts.

Six Chief Forest Wardens, field assistants to the District Foresters, supervise field activities in fire control. One is located in each of the six forest districts, but as has just been mentioned the number has been reduced temporarily to four.

A County Warden in each coöperating county is in charge of fire control activities in his county. Wherever possible these men are combined Forest, Game and Fish Wardens and are jointly paid by the three divisions.

Local District and Deputy Wardens carry on fire prevention and suppression work in areas assigned them. District Wardens carry on educational and other prevention work and are responsible for the suppression of all fires in their districts. Deputy Wardens are largely fire crew leaders.

One, and occasionally two, towermen are observers on lookout duty during the fire season.

Considerable turn-over in personnel has been experienced and in some cases the reduced budget has prevented filling important positions made vacant by resignation. A. D. Folweiler, District Forester, resigned September 30, 1930, and is now a member of the Florida Forest Service. His district was taken over by W. C. Hammerle, already in charge of the Wilmington district. He in turn resigned August 31, 1931, to accept a similar position in the South Carolina Forest Service. W. L. Nothstein was transferred from the Lenoir district to fill this latter vacancy and the Lenoir district was put in charge of W. K. Beichler, already in charge of District No. 1.

With the transfer of Chief Warden C. N. Mease to the Division of Game, October 1, 1930, J. A. Bradshaw, County Forest, Fish and Game Warden in Buncombe County, was given the joint position of Chief Forest Warden

and District Game Warden in District No. 1. On June 30, 1931 Mr. Bradshaw was transferred to the Division of Game and Fred M. Slagle, County Forest, Fish and Game Warden in Macon County, was made Chief Forest Warden of that district. With the resignation of J. P. Stepp as Chief Forest Warden and District Game Warden in the Lenoir district June 30, 1931, E. P. Simmons, formerly Chief Forest Warden in the New Bern district, was appointed to take his place. Mr. Simmons has recently had three years experience with the Southern Educational Project of the American Forestry Association.

C. H. Hearn, now Chief Forest Warden in District No. 6, had charge of the motion picture truck up to July, 1931. From January to April, 1931, he was assisted by James C. Squires of Lenoir. Realizing the need of a thoroughly trained man in this educational work, W. L. Moore, who for three years had been working with the Southern Educational Project of the American Forestry Association, was employed August 15, 1931. Unfortunately, with the suspension of this educational activity, Mr. Moore's services had to be dispensed with February 15, 1932. The resignation of Mrs. Mary P. Phillips from the Raleigh office June 30, 1931, and of Miss Mildred Pierce from the Wilmington office September 30, 1930, must also be recorded.

Federal Aid. Under Section 2 of the Clarke-McNary law, the Department received financial assistance from the Federal Government in forest fire control during the fiscal year 1930-31 in the amount of \$56,880.00, and during the 1931-32 fiscal year \$50,090.62. This represents a total increase of \$20,776 over the amount received as federal aid in the previous biennium. During the 1931-32 fiscal year reduction in the State appropriation and the game fund transfer occasioned the loss of \$6,700 of federal money. In the last fiscal year of the biennium North Carolina was receiving the sixth largest regular federal allotment for forest fire control of the forty states which qualify for Clarke-McNary money. It receives the third largest regular federal allotment of the twelve southeastern states. In a number of states, expenditures made from state appropriations and private funds in excess of the regular federal allotment permit these states to receive considerable amounts of extra federal money. North Carolina, however, received no extra federal allotments because expenditures are barely sufficient to qualify for the regular allotment.

State Appropriations. The State appropriation for forest fire control work was \$9,600 for 1930-31 and \$4,740 (70 per cent of \$6,771) for 1931-32. The appropriation for the biennium was \$27,065 less than the preceding biennium, and was the smallest direct State appropriation in the last ten years.

The appropriation bill again carried a transfer of game and fish funds for forest fire control work. During 1930-31 this transfer amounted to \$42,020, but an act passed by the 1931 legislature limits the amount of this transfer to ten per cent of the receipts from the sale of hunting and fishing licenses which cut down the amount available from this fund to \$16,500 for the 1931-32 fiscal year.

Special State Appropriation: Great Smoky Mountains National Park. The special State appropriation for fire protection on the lands of the proposed Great Smoky Mountains National Park was continued through the biennium, \$1,500 being provided for each fiscal year. In the 1930-31 fiscal year, 40,000 acres in Swain County and 75,000 acres in Haywood were patrolled with this fund, and in the succeeding year, 25,000 acres in Swain and 75,000 acres in Haywood were protected. The services of six patrolmen in the last half of 1930 and five patrolmen for the remainder of the biennium were required. Necessary fire fighting equipment was furnished them. Preparations are made to continue protection on the area through the 1932-33 fiscal year, or until it is taken over for protection by the National Park Service.

County Coöperation. County coöperation became quite difficult to secure during the biennium. Counties were retrenching considerably in their expenditures and a number of them found it necessary to discontinue appropriation. In the 1930-31 fiscal year Madison, New Hanover and Washington counties discontinued work and Cherokee and Clay began coöperation, a net loss of one county. In the 1931-32 fiscal year, Alexander, Beaufort, Brunswick, Cherokee, Clay, Craven, Jackson, McDowell, Pitt, Polk, Richmond and Swain discontinued and Durham, Perquimans and Transylvania began coöperation, a net loss of nine counties. There were forty-three co-operating counties in the former fiscal year and a further reduction to thirty-four counties in the latter year. Appropriations from counties accordingly dropped from \$30,625 in 1929-30, to \$28,500 in 1930-31 and to \$25,750 in 1931-32.

This great fluctuation in county coöperation is regrettable. It prevents any long-time plans from being set up and makes it difficult to obtain satisfactory results from the work. Furthermore, it requires more effort and time each year on the part of the field force to shape up county co-operation, which detracts from their ability to carry on actual fire prevention and suppression duties.

A strong effort was made during the biennium to bring each coöperating county's appropriation to a minimum of one-half cent per acre based on the forest land in the county needing protection. In spite of the financial stress experienced by most counties, a number of them materially increased their appropriation. It is significant to note that counties which have coöperated over an extended period in the past are most stable and provide increased sums for more effective work.

**COUNTIES COOPERATING AND ANNUAL SUMS MADE AVAILABLE BY THEM FOR THE
PAST FIVE FISCAL YEARS**

| County | 1927-28 | 1928-29 | 1929-30 | 1930-31 | 1931-32 |
|-------------------|------------------|--------------------|------------------|------------------|--------------------|
| Alexander..... | 0 | 200 ¹ | 350 | 350 | 0 |
| Avery..... | 300 | 300 | 300 | 400 | 500 |
| Beaufort..... | 0 | 0 | 1,250 | 1,650 | 0 |
| Bertie..... | 800 | 800 | 800 | 600 | 800 |
| Brunswick..... | 1,000 | 1,000 | 1,000 | 1,000 | 0 |
| Buncombe..... | 1,000 | 1,000 | 1,000 | 1,000 | 1,150 |
| Burke..... | 350 | 360 | 400 | 600 | 1,300 |
| Caldwell..... | 650 | 650 | 750 | 750 | 1,000 |
| Cherokee..... | 0 | 0 | 0 | 700 | 0 |
| Chowan..... | 0 | 300 | 300 | 300 | 400 |
| Clay..... | 0 | 0 | 0 | 400 | 0 |
| Columbus..... | 0 | 0 | 2,000 | 2,000 | 2,750 ⁶ |
| Craven..... | 1,000 | 1,950 ² | 1,000 | 1,200 | 0 |
| Cumberland..... | 750 | 750 | 750 | 750 | 750 |
| Duplin..... | 1,200 | 1,200 | 0 | 0 | 0 |
| Durham..... | 0 | 0 | 0 | 0 | 700 |
| Edgecombe..... | 0 | 0 | 500 | 500 | 550 |
| Greene..... | 500 | 500 | 500 | 450 | 500 |
| Halifax..... | 0 | 600 | 600 | 600 | 600 |
| Harnett..... | 500 | 500 | 654 | 600 | 600 |
| Haywood..... | 400 | 400 | 400 | 400 | 400 |
| Henderson..... | 300 | 300 | 350 | 350 | 500 |
| Hertford..... | 500 | 500 | 500 | 500 | 500 |
| Hoke..... | 0 | 400 | 500 | 400 | 400 |
| Jackson..... | 500 | 500 | 500 | 500 | 0 |
| Lee..... | 0 | 300 | 375 | 300 | 300 |
| Lenoir..... | 600 | 1,100 | 600 | 600 | 650 |
| Macon..... | 400 | 400 | 200 ¹ | 600 | 600 |
| Madison..... | 500 | 500 | 500 | 0 ³ | 0 |
| McDowell..... | 500 | 700 | 700 | 700 ⁴ | 0 |
| Montgomery..... | 0 | 0 | 750 | 700 | 750 |
| Moore..... | 750 | 750 | 800 | 1,200 | 1,250 |
| New Hanover..... | 270 ¹ | 300 | 750 | 0 | 0 |
| Northampton..... | 0 | 500 | 500 | 500 | 500 |
| Pitt..... | 500 | 750 | 750 | 850 ⁵ | 0 |
| Polk..... | 300 | 300 | 300 | 300 | 0 |
| Perquimans..... | 0 | 0 | 0 | 0 | 600 |
| Richmond..... | 0 | 0 | 750 | 750 | 0 |
| Robeson..... | 1,200 | 1,200 | 1,200 | 1,300 | 1,900 ⁷ |
| Rutherford..... | 600 | 600 | 600 | 500 | 1,000 |
| Scotland..... | 0 | 500 | 500 | 500 | 600 |
| Surry..... | 500 | 500 | 500 | 400 | 300 |
| Swain..... | 250 ¹ | 500 | 500 | 500 ⁴ | 0 |
| Transylvania..... | 400 | 400 | 0 | 0 | 600 |
| Warren..... | 0 | 0 | 500 | 500 | 700 |
| Washington..... | 0 | 0 | 600 | 0 | 0 |
| Wayne..... | 500 ¹ | 1,000 | 1,000 | 1,000 | 1,000 |
| Wilkes..... | 500 | 500 | 500 | 500 | 500 |
| Wilson..... | 500 | 500 | 650 | 500 | 700 |
| Yancey..... | 300 | 300 | 300 | 300 | 300 |

¹ Cooperated part of year.² Included \$750 for tower.³ Withdrew September, 1930.⁴ Withdrew February, 1931.⁵ Withdrew December, 1931.⁶ Extra appropriation to complete fiscal year.⁷ Extra appropriation for 1930-31 overdraft.

Private Coöperation. Under suitable conditions the private association form of protection is highly desirable. Plans of work and execution of the job are considerably facilitated when dealing with a few private owners who have an interest in the welfare of their property. The results obtained are a great deal more satisfactory since the larger sums provided by private owners usually permit a well planned detection system, fire line construction, more and better equipment, and longer periods of service of employees. Where the rate is sufficient and the area large and compact enough for effective administration, it is much more desirable than the present unstable form of county coöperation where insufficient funds are provided and the forest landowners have only a somewhat indirect interest in the funds provided for protection. The bulk of the private areas being protected at present are within coöperating counties so that the additional assessment rate from the private owners permits much more intensive protection than could be given with county funds. It is difficult, however, to enlarge greatly on the system of private protection since the large contiguous bodies of forest land, except in scattered instances, are divided into numerous small ownerships, many of which are held by absentee owners. In the non-coöperating counties, assessment rates for satisfactory protection would be too high for many owners to participate. Where taxes are too high an obstacle is encountered in furthering this desirable form of coöperation.

During the period of this report it was not only difficult to enlarge the private areas under protection, but a number of members withdrew protection on their holdings due to economic conditions. In the 1930-31 fiscal year there was a slight increase in private areas under protection, but this area was reduced by over 32,000 in the following year. One small area was withdrawn due to the inability to increase the area into a suitable working unit. Two other large areas were withdrawn where the owners could not provide the full assessment rate required. The following statement gives the association areas under protection during the biennium, their location, and the area of forest land listed. The assessment rates varied from 1 cent to 3 cents per acre depending upon the hazard which their lands presented or upon whether it was necessary to provide sufficient funds for additional permanent improvement work.

FOREST PROTECTIVE ASSOCIATIONS

| Name of Association | Assessment Rate Per Acre | Location (County) | Number of Individuals In Association | | Acreage Listed | |
|---------------------------------------|--------------------------|----------------------------------|--------------------------------------|---------|----------------|---------|
| | | | 1930-31 | 1931-32 | 1930-31 | 1931-32 |
| Chemical Wood Corporation..... | 2c | Avery and Mitchell..... | 1 | 0 | 3,000 | 0 |
| Elk Creek Lumber Company..... | 2c | Watauga, Wilkes, Caldwell..... | 1 | 1 | 40,000 | 40,000 |
| South Mountain Association..... | 1c | Burke, McDowell, Rutherford..... | 11 | 9 | 45,141 | 21,040 |
| Table Rock Association..... | 1c | Burke..... | 3 | 3 | 29,307 | 33,400 |
| Moore Protective Association*..... | 2c | Moore..... | 24 | 14 | 16,448 | 16,730 |
| Overhills Protective Association..... | 1c | Harnett, Cumberland, Hoke..... | 3 | 2 | 42,340 | 36,000 |
| Craven Protective Association..... | 2c† | Craven..... | 2 | 3 | 22,200 | 22,200 |
| Serpell Timber Association..... | 1-13 | Carteret..... | 1 | 1 | 6,600 | 6,600 |
| Camp Manufacturing Company..... | 1c | Bertie..... | 1 | 1 | 19,952 | 19,952 |
| Camp Manufacturing Company..... | 1c | Hertford, Gates..... | 1 | 1 | 25,507 | 25,507 |
| Foreman-Blades..... | 1c | Bertie..... | 1 | 0 | 23,819 | 0 |
| Cooper River Timber Company..... | 2-15 | Pender..... | 1 | 1 | 10,280 | 10,280 |
| Orton Protective Association..... | 2c | Brunswick..... | 1 | 2 | 12,000 | 23,000 |
| Waccamaw Protective Association..... | 3c | Bladen, Columbus..... | 3 | 2 | 26,171 | 26,171 |
| Total..... | | | 54 | 40 | 322,765 | 280,880 |

* Contribution made by eighteen additional individuals for fire line construction. Assessment rate doubled (to 4c) in 1931-32.

† Rate increased from 1c to 2c in 1931-32 due to withdrawal of Craven County.

The following chart shows the progress made during the two fiscal years compared with two previous fiscal years.

PROGRESS CHART

| | June 30, 1929 | June 30, 1930 | June 30, 1931 | June 30, 1932 |
|-----------------------------------|---------------|---------------|---------------|---------------|
| District Foresters (number)..... | 5 | 6 | 5 | 4 |
| Chief Wardens..... | 5 | 5 | 6 | 6 |
| County Forest Wardens..... | 42 | 45 | 45 | 34 |
| District Forest Wardens..... | 886 | 1,115 | 1,115 | 931 |
| Deputy Forest Wardens..... | 3,541 | 4,071 | 4,071 | 3,348 |
| Minute Men..... | 2,053 | 2,299 | 2,299 | 1,561 |
| Total Wardens and Minute Men..... | 6,532 | 7,541 | 6,850 | 5,840 |

PROGRESS CHART—Continued

| | June 30, 1929 | June 30, 1930 | June 30, 1931 | June 30, 1932 |
|--|---------------|---------------|---------------|---------------|
| Counties Coöperating (number)..... | 38 | 44 | 43 | 34 |
| Private Timberland Owners Coöperating (number)..... | 55 | 60 | 54 | 40 |
| Forest Area under Protection..... | 8,675,030 | 10,067,763 | 8,964,443 | 6,946,244 |
| Appropriations by Counties..... | 24,050* | 30,625* | 28,500† | 25,750† |
| Appropriations by Private Owners..... | 3,581* | 4,989* | 4,871† | 4,214† |
| Appropriations by State: | | | | |
| From Forestry Appropriation..... | 29,374 | 12,031 | 9,600 | 4,740 |
| From Game Fund..... | 0 | 42,023 | 42,023 | 16,500 |
| Special for Smoky Mountain Park..... | 558 | 2,442 | 1,500 | 1,500 |
| Appropriation by Federal Government..... | 41,438 | 44,757 | 56,883 | 51,609 |

* Budget estimates made at beginning of year.

† Sum of actual amounts made available.

Equipment and Improvements. Reduced appropriations have limited the purchase of much needed fire fighting equipment and the construction of towers and telephones constituting the detection system during the biennium. This has been a decided handicap in the progress of the work.

(a) *Lookout Towers.* The following six steel lookout towers were erected during the period: Chadbourn, Nakina, Sassafras Mountain, Corbin Mountain, Edgecombe and Warren. All of these are of heavy galvanized steel construction with inside stairways and enclosed glass cabins. The Sassafras and Corbin towers were purchased by the South Carolina Forestry Commission, the costs of transportation, material for foundations and erection being borne by North Carolina. In each instance the county in which a tower was placed assisted financially in its purchase and construction.

There are now twenty-seven towers in the detection system consisting of twenty-three steel, three wooden and one stone tower as shown below:

LOOKOUT TOWERS IN THE DETECTION SYSTEM

| Name | Type | Height (feet) | Location |
|---------------------------------------|-------|------------------|--|
| High Top ¹ | Steel | 30 | Swannanoa Mountains, Buncombe County |
| Mt. Mitchell ² | Stone | 24 | Mt. Mitchell, Yancey County |
| Spivey Mountain..... | Steel | 35 | Near Candler, Buncombe County |
| Sassafras Mountain ³ | Steel | 35 | On Sassafras Mountain, Transylvania County |
| Corbin Mountain ³ | Steel | 35 | On Corbin Mountain, Henderson County |
| Biggerstaff ⁴ | Wood | 22 | Near Golder, Rutherford County |
| Pinnacle ⁴ | Wood | 22 | On Pinnacle Mountain, Rutherford County |
| Hibriten..... | Steel | 35 | On Hibriten Mountain, Caldwell County |

LOOKOUT TOWERS IN THE DETECTION SYSTEM—Continued

| Name | Type | Height (feet) | Location |
|------------------------------------|-------|------------------|--|
| Horse Ridge..... | Steel | 35 | On Horse Ridge, near Enola, Burke County |
| Duggar Mountain..... | Steel | 35 | On Duggar Mountain, near Penly, Watauga County |
| Pores Knob..... | Steel | 47 | On Pores Knob, Wilkes County |
| Cameron Hill..... | Wood | 63 | 3 miles W. of Pineview, Harnett County |
| Palestine..... | Steel | 60 | 3 miles N. W. of Slocumb, Cumberland County |
| Pembroke..... | Steel | 80 | 1 mile E. of Pembroke, Robeson County |
| Parkton..... | Steel | 100 | 1 mile W. of Parkton, Robeson County |
| Croatan..... | Steel | 100 | At Croatan, Craven County |
| Norfleet..... | Steel | 80 | 2 miles N. of Windsor, Bertie County |
| Camp ³ | Steel | 102 | At Riddicksville, Hertford County |
| Thomas..... | Steel | 93 | 4 miles W. of Ahoskie, Hertford County |
| Edgecombe..... | Steel | 93 | 4 miles S. W. of Tarboro, Edgecombe County |
| Warren..... | Steel | 80 | Near Liberia, Warren County |
| Bannerman Place ¹ | Steel | 80 | Near Bannerman's Bridge, Pender County |
| Waccamaw..... | Steel | 93 | 5 miles N. of Wananish, Columbus County |
| Orton ¹ | Steel | 80 | On Orton Plantation, Brunswick County |
| Bolivia..... | Steel | 100 | 4 miles S. of Bolivia, Brunswick County |
| Chadbourn..... | Steel | 100 | 1 mile E. of Chadbourn, Columbus County |
| Nakina..... | Steel | 100 | 2 miles S. E. of Nakina, Columbus County |

¹ Privately owned, but manned by the State.

² Presented to the State and erected by Colonel C. J. Harris.

³ Purchased by South Carolina Forestry Commission. Erected by State of North Carolina and manned jointly by the two states.

⁴ Top of Tower not enclosed.

⁵ Erected by State with private funds and later presented to the State.

In addition to the towers listed above lookout points were manned during the fire season at Table Rock, Burke County, the courthouse at Carthage, the Carolina Hotel at Pinehurst, the State Sanatorium in Hoke County, the city water tank in Fayetteville, the National Bank Building in Goldsboro, the National Bank in Wilson and the Kinston Hotel at Kinston. Excepting Table Rock, where a suitable lookout station has been established, steel towers should eventually supplant these lookouts since they are only temporary expedients and are not satisfactory for detection purposes. Lookouts on all of the towers on the National Forests in the western part of the State closely cooperate with State forces by reporting fires detected by these lookouts.

The lookout system is not keeping pace with needs. Less than 40 per cent of the area under protection during the biennium could be seen from towers, fires in the unseen area thus being allowed to burn until of such size that they were detected by ground forces or reported by people outside of the warden organization. Early completion of a tower system to meet present needs is of prime importance. It is definitely known that a tower system, properly tied up with telephone communication, is considerably cheaper and more effective than a ground patrol and fires can be detected and reported much quicker with saving in area burned. Completely erected steel towers cost from \$500 to \$1,400 depending on the height of the tower needed. Their life is above 25 years and maintenance costs are very small.

Numerous visitors are attracted to the lookout towers, especially for the purpose of gaining a vantage point to see surrounding scenery. During the biennium 11,991 people from twenty-nine states and five foreign coun-

tries registered at the towers. A number of tower sites are ideal picnic grounds and much educational work is put across in this way.

(b) *Cabins.* Two, 10 feet by 14 feet cabins were erected, one at the Pinacle Tower in Rutherford County and the other at the Hibriten Tower in Caldwell County. These cabins are occupied by the lookout men on duty during the fire season. Cabins will be placed at all towers in isolated locations where it is necessary for the lookout man to remain at the tower for a continued period of fire weather.

(c) *Telephone Lines.* During the biennium 39.83 miles of ground circuit telephone line and 3.13 miles of metallic circuit line, a total of 42.96 miles, were constructed as follows:

| Name of Line | County | Length (Miles) | Type of Circuit |
|---|-----------------------|-------------------|--------------------|
| Penly to Warden Bolick..... | Watauga, Caldwell.... | 9.00 | Ground |
| Table Rock to Jonas Ridge..... | Burke..... | 7.00 | Ground |
| Table Rock to Warden Beck..... | Burke..... | 9.00 | Ground |
| Darby to Stony Fork..... | Wilkes..... | 6.00 | Ground |
| Bolick to Cook's Store..... | Caldwell..... | 1.25 | Ground |
| Cook's Store to Carlton..... | Caldwell..... | 0.33 | Ground |
| Dugger Tower to Triplett..... | Watauga..... | 7.25 | Ground |
| Riddick Crossroads to Warden Harrell..... | Gates..... | 2.60 | Metallic |
| Dan Newell Extension..... | Bladen..... | 0.50 | Metallic |
| Waccamaw Tower to Caretaker's Home..... | Columbus..... | 0.03 | Metallic |

In view of the extension of the National Forest area in Caldwell County the fifteen mile telephone line from Collettsville to Globe and Mulberry Creek has been transferred to the Forest Service, United States Department of Agriculture, with the understanding that the State may continue to use it without maintenance or other costs. On June 30, 1932, the telephone system consisted of 73.93 miles ground circuit line, and 75.56 miles of metallic circuit line, a total of 149.49 miles.

Plans are now under way to add to the telephone facilities of the Table Rock Association area with especial reference to the Linville Gorge.

The construction of telephone lines in the past has largely been done on private association areas. The small amount of money available from county appropriations will not permit the needed installation of telephone communication to wardens from the lookout towers. The policy of tying in lookout towers with commercial telephone exchanges and with wardens located at strategic points is being continued. Such construction is done only where commercial telephone service is not available.

(d) *Fire Lines and Other Protection Improvements.* Considerable progress is being made on the construction of fire lines, opening up and repairing old roads, and other pre-suppression improvements. In the last half of 1930 there were 53 miles of fire lines burned; 207 miles were burned and 3 miles plowed and burned during 1931, while 6½ miles were burned, 22½ miles plowed and 105½ miles plowed and burned in the first half of 1932. A number of old woods roads on the Orton and Waccamaw Asso-

ciations were opened up for automobile traffic, necessitating construction of three bridges. No information is available as to the character and extent of private endeavor in such improvements.

(e) *Fire Fighting and Other Equipment.* All field equipment was subjected to severe use in the two years, especially during the abnormal fall fire season of 1931. Purchase of new equipment was the smallest in a number of years and the maintenance of old equipment was decidedly cut down with the result that at the close of the period stock was much diminished and in poor condition. However, used fire fighting equipment salvaged from counties that withdrew coöperation permitted partial replacement of old equipment.

The purchase of new fire fighting equipment consisted of 585 fire rakes, 487 knapsack water pumps, 226 brush hooks, 21 lanterns, 80 galvanized buckets, 84 fire swatters, 6 110-gallon water tank trailers, 7 backfire torches and 17 axes. Practically all of this equipment was paid for coöperatively from county and private association funds.

Two Ford roadsters and one pick-up roadster were purchased to replace old cars. In the future virtually all cars will be of the pick-up body type which best suits our needs. Cars used by all of the chief wardens will be equipped with power water pumps and with a 100-gallon water tank and fire fighting equipment for fifteen men. The cars of all of the District Foresters, Chief Wardens and County Wardens were equipped with an attachment for carrying a 5-gallon spray tank for handling spot fires. In coöperation with the Moore Protective Association a 1½ ton Ford truck outfitted with water tanks and fire fighting equipment was purchased and has been used solely for fire suppression work on this Association. At the close of the biennium this truck was traded in, and in coöperation with Moore County a 1½ ton Chevrolet truck was purchased. This new truck will be outfitted with a power pump and other modern fire fighting equipment for use in southern Moore County.

Other miscellaneous equipment purchased consisted of four adding machines for the district offices, lineman's telephone equipment and miscellaneous tools for equipment repairs. Equipment and supplies for fair exhibits and other educational work purchased consisted of a scene-in-action machine, a camera and printing outfit for making up film strips, and six sets of motion picture films.

Educational and Other Fire Prevention Activities. (a) *Motion Pictures.* The motion picture truck continued its showings in six eastern and southeastern counties from July 1 to October 31, 1930. The project was temporarily discontinued to permit the operator to assist in emergency fire control duties in the Wilmington District. The project was again started in January, 1931, and operated in eleven northeastern Piedmont counties to July 9, 1931. During the summer months the truck and all of its equipment were completely overhauled and the project was again put on the road at the opening of the 1931 fall school term. It was then operated through twenty of the western counties to February, 1932, at which time required economy in expenditures necessitated abandoning the work. For the remainder of the biennium the complete outfit has been

stored. Motion picture shows, illustrated talks and lectures were given in 383 schools. There were 1,387 reels of motion pictures shown and 47,213 pieces of forestry literature distributed to 78,414 adults and 68,047 school children. Since the project was started in the fall of 1928, programs have been carried to 831 schools, camps, fairs and other meetings located in eighty-one counties with a total attendance of 258,147 school children and adults. This project has been one of outstanding educational effort in forest fire prevention and game and fish conservation.

In addition to the regular motion picture truck's operations, the district and central offices conducted separate motion picture shows with an auxiliary outfit in many cooperating counties. The purpose of these shows was to intensify our educational activities. Thirty-one motion picture shows and nine illustrated lectures were given. Open air shows were given to summer residents at Lake Waccamaw in July and August, 1931, the Council Tool Company making provisions for seating the audience.

(b) *Fairs and Other Exhibits.* The usual efforts were made to carry the message of forest fire prevention and forestry practices to the people of the State through exhibits. In the two year period displays were placed at thirty-two county and district fairs. An excellent exhibit was placed at the Eastern Carolina Exposition at Greenville in April, 1931. A window exhibit was placed in Farmville during its sixtieth anniversary celebration. An attractive float was also entered in the Rhododendron Festival in Asheville. Assistant Forester Flory had charge of the Department's 60-foot exhibit at the State Fair during both years. It is estimated that 514,700 people saw the exhibits which were placed during the period. Forestry literature in the amount of 14,740 pieces was distributed. The United States Department of Agriculture, Forest Service, cooperated in furnishing attractive material for all of the fair exhibits. It is expected that there will be an appreciable decrease in this activity during the fall fair season of 1932 due to the discontinuance of a number of county fairs.

(c) *Carolina Forest Week.* The usual field activity during Carolina Forest Week was much retarded. In 1937, 257 schools and 17 other organizations carried out Carolina Forest Week programs; 249 talks and motion picture shows were given; 99 window displays placed; 2,954 square inches business advertisements in newspapers, and 13,025 pieces of forestry literature distributed. A severe fire period and a reduced budget practically eliminated such efforts in 1932.

(d) *Publications.* "The Forest Warden," a quarterly publication on forest fire control activities distributed to the warden organization, the forestry exchange, newspapers, County Commissioners and lumber companies, was issued but three times during the biennium. The September and December, 1930, issues were combined, while the March and June, 1931, issues were published as usual. Required economy in printing did not permit its publication in the 1931-32 fiscal year. Each issue averaged 5,300 copies. This publication represents the only printed fire control information reaching the warden organization. Its publication should be resumed as soon as conditions permit.

The "Manual of Instructions to Forest Wardens" printed in 1927 is out of date and the supply exhausted. While lack of funds has not heretofore permitted its revision, plans have been made to reprint it in the near future.

(e) *Other Educational Activities.* The press of the State is of great assistance in bring before the people items pertaining to destruction caused by forest fires and fire prevention information. The field force reports the finest coöperation from the press and the Division of Commerce and Industry has rendered good service in preparing fire prevention information for acceptance by the press. In order to provide first hand information on the fire situation for the central office and the press a daily post card report is being submitted by each district office during the fire season giving local fire conditions.

Radio talks have been given over stations WPTF, WWNC and WBT. During the serious 1931 fall fire season, bulletins were broadcast at frequent intervals each day from the seven radio stations in the State. These bulletins carried cautions regarding care with fire in the forests and giving timely facts on the fire situation.

(f) *Posters, Signs, etc.* Posting of fire warnings was vigorously continued. There were 9,000 weather-proofed posters and 5,000 indoor posters purchased and distributed. In addition to the usual posting along side roads, trails and streams, fire warnings are now being placed on attractive white and red posts along the State highways in coöperating counties for the purpose of warning motorists to be careful with fire. Much favorable comment, especially from non-residents, has been made regarding the aluminum and green shield signs placed on county lines on State highways. The direction and distance to each fire tower is now marked by a large steel sign. There were purchased and distributed to high school libraries, Boy Scout organizations and school teachers, 9,000 attractive reprints of two articles published by the American Forestry Association entitled "Forests and the Future of America" and "Wild Life in a Forest Fire."

The motion picture truck distributed to school children 10,000 blotters carrying fire prevention slogans, 10,000 handbills advertising motion picture showings, and other printed matter. The United States Department of Agriculture furnished free of charge some 25,000 pamphlets of five different issues for distribution to fairs, schools and other meetings. More than 10,000 forest fire law leaflets were distributed.

Warden Meetings. The annual conference of District Foresters and Chief Wardens was held at Ridgecrest August 25-27, 1930. Some thirty people including foresters from adjoining states and from the United States Forest Service attended. Papers were presented and plans discussed for improving forest fire control activities. Lack of travel funds prevented holding a similar meeting in the last fiscal year; however, a short one-day conference was held following the annual meeting of the American Forestry Association at Asheville in June, 1931.

Meetings of the County Forest Wardens were held in each district preliminary to the opening of each spring fire season. Game wardens from non-coöperating counties attended these meetings and took active interest in the discussions. Annual warden schools of instruction in each county

were continued, and warden picnics are now being promoted in several counties.

Fort Bragg. The Fort Bragg Military Reservation, located in Cumberland and Hoke counties, presents a difficult fire control problem. Practically all of its 122,000-acre area is a high fire hazard which has been subject to repeated and destructive fires. In December, 1930, at the request of the commanding officer a fire plan was drawn up for the reservation recommending the construction of fire lines about its sixty-mile boundary and within the area, the burning of all target and gun locations, and the organization and equipment of crews of fire fighters.

Rate of Pay to Fire Fighters. In keeping with the prevailing rate of pay to laborers in similar occupations and to offset any possibility of fires being started for the purpose of obtaining remuneration, the rate of pay to pick-up labor in fire suppression was reduced from 20 cents per hour to 15 cents per hour, effective in November, 1931. At the same time members of registered fire crews were reduced from 25 cents per hour to 20 cents per hour. The rate of pay to fire suppression labor was further reduced in February, 1932, to 10 cents per hour.

Forest Fire Survey. Information regarding the occurrence and damage caused by forest fires in the unprotected areas of the State has heretofore been very meagre and inaccurate. The destruction caused by fire in 1931 was of such magnitude that more comprehensive and accurate data was needed in order to compile complete information for the State as a whole. Immediately after the close of the calendar year a county-by-county survey in the non-coöperating counties was made, sometimes in company with the County Game Warden. This survey showed that on the 20,568,000 acres of forest land in the State needing protection, 1,722,369 acres were burned over in the calendar year, doing estimated damage in the amount of \$4,786,225. One-twelfth of the total forest area of the State was covered by fire during the year. The value of organized fire protection is strikingly shown by the fact that on the national forests in the State where adequate protection funds are available, but 0.41 per cent of the protected area was burned; on the areas protected by the State with inadequate funds 4.12 per cent of the protected area burned, while on the unprotected areas 11.27 per cent was burned.

The following chart shows the area burned and damage for protected and unprotected forest lands in the calendar year 1931:

AREA BURNED AND DAMAGE FOR PROTECTED AND UNPROTECTED AREAS—
Calendar Year 1931

| | National Forests | Protected by State | Unprotected | Total |
|---|---------------------|-----------------------|--------------|--------------|
| Forest Area in State needing protection (acres)..... | 561,227 | 7,483,639 | 12,523,134 | 20,568,000 |
| Area burned (acres)..... | 2,274 | 308,317 | 1,411,778 | 1,722,369 |
| Damage to timber and other values..... | \$ 1,250 | \$ 536,889 | \$ 4,248,086 | \$ 4,786,225 |

Fire Occurrence and Statistics. Hazardous fire periods during the biennium, were of unusual duration and were abnormally severe. Unfavorable weather was prevalent over the greater portion of the period, resulting in the occurrence of an exceptionally large number of fires with widespread areas burned and heavy damage.

Owing to accumulated deficiencies in rainfall the last half of 1930, reaching some 13 inches by the middle of October, the eastern districts experienced severe conditions from August to the middle of December, but there was little fire in the mountains.

The whole of 1931 was probably the worst fire year on record. The mountain region had extremely serious fire conditions during the late winter while the eastern counties had practically an unbroken fire period from January 20 to May. The fall fire season eclipsed any similar period since organized fire protection began. Only the month of August had above normal rainfall and there immediately followed three months of the most severe and extensive drought ever recorded in the State. An unusual number of fires occurred and damage to the forests of the State was appalling. The mountain districts experienced little difficulty in handling the fire problem; but in the Coastal Plain, conditions reached critical proportions. An unbroken fire period here extended from September 3 to November 28, and on Thanksgiving day a total of 104 new fires were reported from the coöperating units, the highest number of new fires occurring in one day during a fall period ever reported. Some of the greatest damages occurred in the heavily timbered swamp areas in the eastern part of the State into which fire rarely enters. Fires were kept well under control in organized counties, but in non-coöperating counties they covered tremendous areas with heavy losses. A blanket of smoke lay over the State, interrupting traffic on land and water and in the air. Numerous accidents and several deaths were reported attributed directly to fire.

The spring fire season of 1932 on the whole was as serious as that of 1931 from the standpoint of occurrence of fires and area burned.

On the whole a larger number of fires was handled on the protected area by the warden organization than during any similar period in the past. Control of fires was difficult and costs of suppression, in spite of heavy wage reductions, was 65 per cent higher than the previous biennium. With a shrinkage in timber and other property values, damage occasioned by fires doubled over that of the previous biennium. The field force, working under the handicap of reduced personnel, volunteer warden service, and inadequate equipment experienced great difficulty in properly handling the work.

The following is a summary of fire statistics, law enforcement and warden activities on the protected areas for a four-year period ending June 30, 1932.

FOREST FIRE STATISTICS FOR PROTECTED AREAS BY FISCAL YEARS

| | 1928-29 | 1929-30 | 1930-31 | 1931-32 |
|---|------------|------------|------------|------------|
| Area under protection, acres..... | 8,675,030 | 10,067,763 | 8,964,440 | 6,946,244 |
| Number of fires by classes: | | | | |
| A—under ¼ acre..... | 48 | 51 | 64 | 68 |
| B—¼ to 10 acres..... | 486 | 973 | 801 | 892 |
| C—11 to 100 acres..... | 560 | 1,487 | 1,522 | 1,463 |
| D—101 to 500 acres..... | 142 | 402 | 496 | 403 |
| E—over 500 acres..... | 22 | 51 | 78 | 72 |
| Total..... | 1,258 | 2,964 | 2,961 | 2,898 |
| Causes of fires: | | | | |
| Brush burning..... | 257 | 570 | 386 | 460 |
| Hunters, fishermen, campers..... | 111 | 176 | 325 | 519 |
| Railroads..... | 80 | 125 | 80 | 74 |
| Lumbering..... | 58 | 92 | 50 | 37 |
| Incediary..... | 202 | 743 | 680 | 620 |
| Smokers..... | 232 | 498 | 591 | 526 |
| Lightning..... | 5 | 10 | 28 | 10 |
| Miscellaneous..... | 103 | 276 | 299 | 258 |
| Unknown..... | 210 | 474 | 522 | 394 |
| Total..... | 1,258 | 2,964 | 2,961 | 2,898 |
| Area burned, acres: | | | | |
| Merchantable timber..... | 23,343 | 47,867 | 71,812 | 60,278 |
| Reproduction..... | 60,548 | 150,627 | 184,773 | 184,364 |
| Open grass land..... | 8,773 | 36,511 | 29,861 | 25,299 |
| Total..... | 92,664 | 235,005 | 286,446 | 269,941 |
| Average area per fire, acres..... | 74 | 79 | 97 | 93 |
| Per cent protected of area burned..... | 1.1% | 2.3% | 3.2% | 3.9% |
| Damage: | | | | |
| Merchantable timber..... | \$ 47,253 | \$ 108,861 | \$ 147,918 | \$ 135,249 |
| Reproduction..... | 94,881 | 259,143 | 344,336 | 361,906 |
| Other..... | 15,477 | 29,544 | 43,333 | 37,037 |
| Total..... | \$ 157,611 | \$ 397,548 | \$ 535,587 | \$ 534,192 |
| Average damage per fire..... | \$ 125 | \$ 134 | \$ 181 | \$ 184 |
| Total fire fighting costs..... | 12,818 | 26,239 | 33,170 | 30,399 |
| Average fire fighting costs per fire..... | 10.20 | 8.85 | 11.20 | 10.49 |
| Law enforcement: | | | | |
| Number of prosecutions..... | 73 | 203 | 122 | 101 |
| Number of convictions..... | 52 | 44 | 91 | 83 |
| Number of acquittals, etc..... | 19 | 57 | 31 | 18 |
| Fines and costs..... | \$ 757 | \$ 2,362 | \$ 1,257 | \$ 1,192 |
| Responsible parties apprehended: | | | | |
| Number of parties billed..... | 161 | 534 | 296 | 229 |
| Number making payment..... | 146 | 445 | 255 | 132 |
| Amount received..... | \$ 1,476 | \$ 4,095 | \$ 2,024 | \$ 934 |

FOREST FIRE STATISTICS FOR PROTECTED AREAS BY FISCAL YEARS—Continued

| | 1928-29 | 1929-30 | 1930-31 | 1931-32 |
|---|---------|---------|---------|---------|
| Cost paid by landowners: | | | | |
| Number of parties billed..... | 7 | 56 | 14 | 8 |
| Number making payment..... | 7 | 35 | 11 | 8 |
| Amount received..... | \$ 58 | \$ 333 | \$ 136 | \$ 79 |
| Warden activities: | | | | |
| Number of hours worked..... | 44,394 | 113,578 | 66,709 | 66,725 |
| Miles traveled: car, foot, horse..... | 195,029 | 345,797 | 156,714 | 159,084 |
| Number of notices posted..... | 11,407 | 18,737 | 3,476 | 4,178 |
| Number of people interviewed..... | 56,214 | 86,380 | 40,532 | 39,451 |
| Number of sawmills inspected..... | 893 | 1,507 | 370 | 290 |
| Number of schools and meetings visited..... | 1,160 | 2,057 | 519 | 588 |

Recommendations. There are approximately 20,500,000 acres of forest land in the State needing protection from fire. The greatest area ever protected under the present form of coöperation was about 50 per cent of the total forest area and this amount under protection has dropped at present to approximately 33 per cent of the total area needing protection. The average yearly fire damage in North Carolina is certainly well over \$1,000,000, and in abnormal years such as in 1931 the damage may approach as much as \$5,000,000. The area of land left unproductive in the State through the ravages of fire is still alarming.

The present system of county and private coöperation is unsatisfactory. Counties most needing protection are not financially able to make appropriations at all, and such counties which do coöperate are not able to provide sufficient allotments for adequate protection. Furthermore, it is exceedingly difficult to convince the average Board of County Commissioners that appropriations should be provided, and so many political considerations influence the work that periods of coöperation are spasmodic and consequently quite ineffective.

In order to put across a satisfactory program of forest fire control it will be necessary to extend activities to every portion of the State. Such activities must be carried on irrespective of county boundaries and with a minimum financial dependence upon counties or individuals. The work should be State supported to the extent of at least paying all overhead expenses and fire prevention costs, while counties might well be required to pay all or a part of *suppression* costs on the basis of their forest land area and the hazard presented. A direct State appropriation of not less than one cent per acre per annum would be necessary to assure State-wide activities. Emergency appropriations might also be needed to take care of abnormal fire years. The federal estimate of the cost of adequate forest fire protection in North Carolina is a total of \$632,000 a year from all sources—the term “adequate” meaning that not more than one-tenth of one per cent of the forest land area should burn in one year.

Even under the present methods of operation a larger full-time personnel is needed. The average district has under its supervision approximately

1,750,000 acres of forest land at present. The limit should be 1,000,000 acres. The organization set up in the counties at present is not nearly adequate to take care of even normal conditions and in abnormal years the situation is uncontrollable. Full-time county warden service should be provided. The present towermen's services must be utilized throughout the fire period regardless of its length. The complete district and deputy warden organization should be greatly changed or entirely abolished and fire crews should be provided in its stead, with full-time crew leaders available through the fire season. Provision should be made in every instance for employing emergency help.

The detection system is far behind even our present program. Only 40 per cent of the present protected area can be covered by lookouts. To properly cover the present 7,000,000 acres under protection, nineteen additional primary towers will be required. The present telephone system of approximately 150 miles would have to be doubled in order to meet our present needs.

All fire fighting equipment in use today is of the manually operated type and entirely insufficient. Effective fire control work will never be reached until hand operated fire fighting equipment is supplemented by power equipment. The fire suppression job in North Carolina is far too great to depend entirely upon hand operated tools.

There is a rapidly growing need for a law enforcement officer connected with the Department to advise and guide all law enforcement work. The field forces of the Forestry Division are of necessity being more and more occupied with the work of fire suppression, improvement construction, and other pre-suppression work. For this reason the preparation of court cases is not receiving the prompt and intelligent attention it should have. The enforcement of conservation laws has a technique of its own, and the advantage of experience is tremendous. It would seem advisable, therefore, to have connected with the Department a legal assistant who would be prepared to advise the officials and agents of the various Divisions in the enforcement of the conservation laws. Such an official should have the backing and support of the Attorney General's office as is now in effect with the State Highway Commission.

The following immediate legislative needs should be considered:

1. A large per cent of the fire problem over most of the State can be attributed to careless brush burning and burning new ground. A definite restriction should be placed on these activities, probably in the way of prohibiting such burning at certain times of the year, corresponding with our fire seasons, without a special permit.

2. Our present law, (C. S. 4309) treats incendiarism as a misdemeanor. This law should be changed in such a way as to make incendiarism a felony (punishable by imprisonment), and the "careless" feature of the law still continued as a misdemeanor.

3. Fires originating from hunters during the fall periods of 1930 and 1931 reached alarming proportions. Unless Section 15 of the North Carolina State Game Law is sufficient to cover the case in point, action should be taken to legalize the closing of hunting or fishing seasons during periods of drought.

FOREST PLANTING

Following the gradual enlargement of the forest fire prevention work and the enactment of the Conservation Law of 1925, it became advisable and possible at least in part, to guide landowners in their desire to reforest their eroded and otherwise devastated lands and to supply them with suitable trees. The State College very courteously allowed the use of an acre or more of its Raleigh farm near Pullen Park for the establishment of a small temporary nursery from which the first State grown seedlings were shipped in 1926. The General Assembly of 1928 made available \$1,200 for the purchase of a suitable forest nursery site and 9.3 acres on highway No. 10 near Clayton and only fourteen miles from Raleigh was secured. In July, 1931, negotiations for the addition to the nursery consisting of 4.9 acres on the east side of the original purchase near Clayton were completed. This makes the nursery a well contained unit with the possibilities of rapid expansion as soon as funds and the demand require it. This nursery site has the threefold advantage of suitable soil, maximum transportation facilities, and what is probably of even greater importance, excellent publicity and educational value. F. H. Claridge, who joined the Department in 1925 as Assistant Forester in charge of forest planting, has trained a local man, Addie Pace, into an efficient and interested nurseryman. The effort to secure funds for the establishment of a branch nursery in the mountain region of the State was not successful, so a coöperative arrangement was made with the Champion Fibre Company to furnish available stock from their private nursery at Canton, N. C., to those applying for mountain species. This arrangement has worked well, but with the decline of their nursery work some other plan must soon be adopted.

DISTRIBUTION OF FOREST SEEDLINGS BY SPECIES, 1930-32

| | 1930-31 | 1931-32 |
|-----------------------------|---------|---------|
| Longleaf pine..... | 75,225 | 10,568 |
| Shortleaf pine, 1-year..... | 9,450 | 41,813 |
| Shortleaf pine, 2-year..... | 7,200 | |
| Black locust..... | 8,575 | 22,319 |
| Black walnut..... | 17,591 | 36,431 |
| Loblolly pine, 1-year..... | 90,550 | 94,048 |
| Loblolly pine, 2-year..... | 80,800 | |
| Slash pine..... | 31,800 | 9,800 |
| Tulip poplar..... | 125 | 27,827 |
| Red pine..... | 9,400 | |
| Chestnut..... | 4,902 | 1,600 |
| White pine..... | 3,000 | |
| Balsam..... | 13,700 | |
| Miscellaneous..... | 13,107 | 5,400 |
| Total..... | 365,425 | 249,806 |

Planting Activities. Of the forest planting work probably the most interesting feature during the period 1930-1932 has been the tremendous increase in the number of individuals taking advantage of the Department's offer to furnish at a nominal price forest planting stock grown in the

State Nursery. The number of coöperators has increased from 490 during the previous biennium to 1,859 during the present period. The total number of trees distributed also exceeds that of the previous biennium by approximately 22,000 trees. However, the number of trees distributed fell off during the planting season 1931-1932, though the number of coöperators increased from 617 in planting season 1930-1931 to 1,242 during the past season. The average number of trees per coöperator was about 330. This figure was lower than the previous biennium due to the many small orders sent to 4-H Clubs, Boy Scouts and schools. The results from educational work in schools through the tree planting program were very gratifying. Some seventy-two schools planted approximately 164,000 trees during this biennium. Duke University took a large number of trees which were planted in its demonstration forest. Many of the school principals and vocational agricultural teachers have stated that the plantations established in former years were of great benefit in teaching the students conservation and forestry principles. During the last planting season no general offer was made to schools. However, requests for seedlings came from about forty of the high schools of the State and most of these were supplied free of cost.

Boy Scouts were still active in planting projects. Some eighteen groups planted a total of 6,350 trees. The Assistant Forester in charge of planting gave help in personal supervision wherever it was possible to these groups. Planting on the Raleigh municipal watershed at Lake Johnson was undertaken two years in succession by a group of Scouts supervised by Assistant Forester Claridge, and there is now at this place a promising plantation of different species of pines and black locust.

The most popular and perhaps the most useful contribution which the forest nursery has made to the forestry program is the distribution of black walnuts to 4-H Club members. With the coöperation of the Extension Forester and the County Agents about 1,600 4-H Club boys and girls were supplied with twenty-five black walnut trees each for which they paid one cent a tree. The packing and shipping of these small orders entailed considerably more expense than the larger orders, but the results in most cases have been very gratifying.

DISTRIBUTION OF FOREST SEEDLINGS BY CLASS OF COOPERATORS, 1926-1932

| Class of Coöperators | Biennium 1930-32 | | Total Period 1926-32 | |
|--------------------------------|--------------------|--------------|----------------------|--------------|
| | Number Coöperators | Number Trees | Number Coöperators | Number Trees |
| Farmers..... | 155 | 321,856 | 329 | 865,622 |
| Individuals and Companies..... | 6 | 1,688 | 24 | 131,157 |
| Schools..... | 72 | 164,103 | 198 | 207,308 |
| State Institutions..... | 15 | 67,764 | 22 | 99,434 |
| Boy Scouts..... | 18 | 6,345 | 26 | 10,605 |
| 4-H Clubs..... | 1,591 | 39,775 | 1,841 | 48,096 |
| Fort Macon State Park..... | | | 2 | 10,285 |
| Lake Rim..... | | | 1 | 7,500 |
| Mt. Mitchell State Park..... | 1 | 13,700 | 3 | 58,000 |
| Total..... | 1,858 | 615,231 | 2,446 | 1,438,307 |

Experiments on Statesville Erosion Farm. At the request of the Director of the Experiment Stations of this State and the U. S. Bureau of Chemistry and Soils, an experiment in the control of erosion by the planting of trees was started at the recently established federal Erosion Farm near Statesville, North Carolina. Some 2,223 pine and locust trees were planted, the work on which was done and the cost carried by the Forestry Division. While the experimental area, because of its steepness and advanced erosion, furnished one of the most difficult control problems on the farm, it is hoped that this plantation will be successful in proving to the farmer that erosion can be checked and eroded lands made productive by the use of forest trees. The planting of trees in North Carolina for the control of erosion has bright prospects. A plantation on the State Agricultural Experiment Farm in this same county which was established several years ago with trees supplied by the State Forest Nursery has already shown the feasibility of planting trees to control erosion in Piedmont North Carolina.

Asiatic Chestnut Plantations. The progress of the chestnut blight has been more rapid during the past two years than for any previous equal period. Practically all our mountain hardwood forests in which chestnut has been the most abundant commercial tree have been infected and nearly all chestnut trees are either dead or fatally diseased. In its effort to remedy the situation, the federal government has continued its experiments with Chinese and Japanese chestnuts which in their native forests are resistant to the disease. During this biennium through the coöperation of the U. S. Bureau of Plant Industry, Department of Agriculture, 16,350 Asiatic chestnut trees have been received from the Bureau of Plant Industry and kept in the State Forest Nursery for one and two years, to be later planted experimentally on lands in public control. The following number of trees have been transplanted onto lands controlled by the institutions mentioned; and with the exception of those planted by State College and Duke University, which furnished their own technical supervision, all were planted under direct supervision of the Assistant Forester. Hill Forest, Durham, property of State College, 506 trees; Lake Rim, Fayetteville, property of the North Carolina Department of Conservation and Development, 577 trees; School for the Deaf, Morganton, 323 trees; State Hospital for Insane, Morganton, 314 trees; Jackson Training School, Concord, 319 trees; Rendezvous Mountain State Park, North Wilkesboro, 433 trees; Hospital for the Insane, Goldsboro, 1,378 trees; and Duke University, Durham, 2,667 trees. Two or three individuals were also supplied with trees because of the exceptional desirability of the project for experimental purposes.

George Washington Bi-Centennial. The George Washington Bi-Centennial Tree Planting Program which was carried on during the two planting seasons of 1930-1931 and 1931-1932 received a good response in North Carolina. A great many trees were registered by civic organizations, schools, Boy Scouts, and boys' and girls' clubs. Each organization which held ceremonies and planted the trees in honor of George Washington received a certificate upon application to the American Tree Association. Ten councils of the Boy Scouts throughout the State received trees grown at the State Nursery from nuts secured at Arlington, the home of Robert E. Lee, and from

Guilford Courthouse Battlefield. A Mount Vernon black walnut seedling was planted on the Capitol Square at Raleigh on April 25, 1931, with Governor Gardner and Judge Francis D. Winston, Chairman of the George Washington Bi-Centennial Committee, taking part. On June 3, 1931, a Mount Vernon black walnut tree, two years old, was secured from the State Nursery and planted on the plaza in front of the courthouse at Asheville. This was attended by over 100 Boy Scouts, a great many members of the American Forestry Association, patriotic organizations, and citizens of Asheville. It is estimated that 700 or 800 people were at this ceremony. Some of the schools and organizations planting trees in the State in the spring of 1932 were the Colonial Dames at the Joel Lane House, Raleigh; St. Mary's School, Raleigh; North Carolina College for Women, Botany Club, Greensboro; the D. A. R. of Farmville; and many public schools which received trees from the State Forest Nursery with this in view.

Highway Plantings. The increased demand by civic and other organizations for material and for supervision of highway planting projects shows that this work has received a tremendous impetus in recent years. The lack of funds and time for this work has restricted the scope and hampered the effectiveness of the supervision and work. Two projects, however, were undertaken. The planting on the Western Boulevard on Highway No. 10, leading from Raleigh to Durham, was continued in coöperation with the Raleigh American Business Club with the addition of 614 trees for the two years. Most of the trees previously planted have done well, the black locust having made exceptional growth, but there is of necessity too large an annual replacement. The Fort Bragg authorities and the city of Fayetteville requested assistance in beautifying the road between Fayetteville and Fort Bragg and the Fort Bragg authorities asked for assistance in securing shrubs and advice for planting the highway through the Fort property. The Assistant Forester in charge of forest planting spent two or three weeks on this project and supervised the work of the Highway Department in setting grass on the shoulders and in planting 400 trees along the edge of the right-of-way. The results from this planting showed promise until vandals destroyed thirty-two tulip poplar trees by pulling them up and throwing them on the ground. The dry season of 1932 killed some of the planted shrubs and trees. A grass fire burning on the Fort property has also done considerable damage.

Many requests for technical information on planting shade trees have made it necessary to prepare a circular on this subject and this was done in 1932. The circular, called: "Shade Tree Planting in North Carolina," gives directions for transplanting large trees of different kinds and suggests the more desirable trees to plant in different sections of the State. As yet it has been issued only in mimeograph form.

Experiments at the Nursery. The serious damage caused by the larvae of the May beetle, or what are known as white grubs, at the State Nursery at Clayton, made control methods necessary. A large number of trees of several species during both years of the biennium was destroyed by these grubs eating the roots. Coöperative experiments have been undertaken with the Forest Entomologist attached to the Appalachian Forest Experi-

ment Station. Poison solutions are applied to the soil in varying strengths so that a strength sufficient to kill the grubs and not enough to kill the trees may be found. It is hoped that by next year definite control will be in operation.

Mount Mitchell Planting. During the year 1931, 13,700 balsam trees were added to the plantations on Mount Mitchell State Park, but lack of funds made the postponement of this work necessary in 1932. It was planned to add to the plantations yearly until the bad fire scars had been completely covered. The Park Warden has been keeping the wild stock of balsam seedlings in the small nursery on the top of the mountain in good condition and has made additional seed beds so that when conditions warrant, planting can be resumed without having to wait for planting stock.

The problem of securing trees for residents of the mountain counties suitable for their conditions was handled this biennium as in previous years through the courtesy of the Champion Fibre Company, with whom this Department had an agreement whereby the trees in their nursery were secured at a very low price. The demand for a mountain nursery has been insistent, but money has not become available as yet to start one in this section of the State. During the biennium 23,435 trees were secured for coöperators from the Champion Fibre Company's nursery.

The planting activities of the Division from the inauguration of the nursery work in 1925 to and including the spring shipments of 1932 include the growing of 1,438,307 trees distributed to 2,446 coöperators, making an average shipment to each coöperator of 588 trees. This low average shipment is due to the fact that some 1,841 4-H Club members received individual packages of only 25 trees each. The educational value of these small shipments, however, far outweighs the additional trouble and expense involved in making them.

For many years to come forest planting in North Carolina will be done chiefly by farmers and other resident landowners in order to protect or restore the value of the place in addition to increasing the actual timber productive capacity of the planted area. The policy, therefore, of supplying as many coöperators as possible will continue to be followed as it was during the first years of the nursery because small plantations started all over the State are the best introductions to forestry and the strongest reasons for the prevention of forest fires. Until greater uniformity in valuation and taxes can be assured, the thought of considerably increasing the investment in wild land by spending several dollars an acre for stock and labor will no doubt deter many of those who hold land simply for the profit in the investment.

STATE PARKS AND LAKES

The State park policy of the Department was formulated in a law enacted in 1915 and it had its practical beginning with the purchase of Mount Mitchell State Park by a special legislative commission authorized by the same General Assembly. The following year, Governor Bickett entrusted the administration of this Park to the Geological and Economic Survey. It was not until 1924 that a second park with quite different problems was

added by the granting to the State by the Congress of Fort Macon Military Reservation. The administration of both these State parks was placed in the hands of the State Forester who has given them his continued personal attention. In 1925 the passage of the conservation law also placed the administration of State lakes with the Department of Conservation and Development which succeeded to all the duties and privileges of the former Geological and Economic Survey. Since the major problems of the lakes as well as the parks relate to their recreational use by the public, these also are administered directly by the Forestry Division.

Mount Mitchell State Park. This State park of 1,224 acres has an average elevation in excess of 6,000 feet and includes the park which according to the latest authoritative figures rises to a height of 6,684 feet. It was originally covered with a dense forest of spruce and balsam timber, but the larger part of it was cut over prior to its purchase by the State in 1915. There is now some 200 acres of uncut forest along the higher elevations, but the lower slopes after being cut and burned have come up largely to fire cherry, yellow birch, red raspberries and blackberries. Since practically all seed trees and seedlings were destroyed by fire, it will probably be necessary to replant most of this area. Already some 105 acres have been planted over a period of ten or twelve years, and some 30,000 little balsam trees in transplant beds on the Park are now ready for planting next spring.

The State law under which this park was acquired forbids the cutting of live timber on the Park. However, on these high altitudes windfall is serious, not only destroying the live timber, but greatly increasing the fire hazard. In order to remove and utilize as much as possible of this down timber, and thereby reduce the danger from fire, contracts were made with two or three local men to get out the material for pulpwood at a stumpage price of from 50 cents to \$1 a cord depending on location. A total of \$398 was realized from these sales, but the high cost of operation has prevented further utilization.

In the fall of 1931 the cabin was much improved by lining the warden's rooms with cement board. This adds greatly to his comfort during the cold fall and early spring weather.

The warden, Ed Wilson, in addition to his chief duties of watching visitors and protecting the park from fire and from vandalism, has been acting as volunteer weather observer making daily records of rainfall and temperature. To this has now been added the care of two additional instruments, a hygro-thermograph and a sling sychrometer. This, the highest weather observation station in eastern America, is now one of several stations furnishing daily information to the newly established fire weather forecast service at Asheville.

Fort Macon State Park. This State park, bordered on the north by Bogue Sound and on the south by the Atlantic Ocean, has a rather variable acreage owing to the erosion and accretion of the shore line, especially adjoining Bogue Inlet. A heavy storm on March 3, 1932, washed away the extreme eastern end of the accretion referred to in the previous Biennial Report, though a long, curved sand bar enclosing a basin still remains and the

grass, part of which was planted artificially, is tending to hold the sand and increase its stability.

On the purchase in the fall of 1931 of the property bounding Fort Macon State Park on the west by Carr and McClamrock, the necessity for agreeing on the exact location of the boundary line became apparent. The above parties contended that the granite monument on the marsh marked the north and south line called for in the State's deed as the western boundary. Careful surveys by the Engineering Division of the Department were made which still left some doubt as to the position of the original boundary line; however, since this monument was the one which seems to have been recognized by the engineers of the War Department prior to the State's ownership, an instrument has been executed and registered in the courthouse at Beaufort declaring the agreement of the interested parties to this line.

Miscellaneous Areas. The interest shown at the annual meeting of the National Conference on State Parks at Linville in June, 1930, in securing Linville Gorge and Grandfather Mountain as a State park or other public recreation area led to the appointment of a committee by the Board of Conservation and Development to see what could be done toward securing them. The difficulty of getting in touch with the owners and the still more serious difficulty of securing funds have so far proved insuperable objections to any progress towards this much-to-be-desired plan. Any program of State or federal acquisition of land for parks or other public purposes should include the permanent protection and administration through acquisition of these areas.

State Lakes. Of the five State lakes in Bladen County; namely, White, Singletary, Black, Jones, and Salters lakes, only one, the first mentioned, has been put under administration. This and Waccamaw Lake in Columbus County have been used more largely for recreation than the others and it has been necessary to formulate regulations and to control the public use of these two lakes so far as it has been possible under the inadequate appropriation and small revenue received for such purpose.

Since there is no land surrounding these lakes belonging to the State, all the shore lines being in private hands, the difficulty of administration has been considerably increased. The regulations so far put into force are designed to so properly control such private use that the public shall not be excluded from its rightful use of such State property which has been devoted to recreational purposes.

Some attempt at restocking these State lakes has been made, but here again the lack of State-owned land on the lake shore as well as available funds, has prevented proper protection to the young fish. In May, 1931, some 7,850 black bass fry were sent to Waccamaw Lake from the Fayetteville Hatchery and about 11,000 put in White Lake. In May, 1932, the Fayetteville Hatchery sent some 1,500 black bass to Jones Lake and 6,000 to White Lake. A few of these may have been put in Black Lake. Had the State been able to place these fry in protected areas against the shore, there would have been a much better prospect of their growing up.

Waccamaw Lake with a surface area of over 6,000 acres is recognized as good fishing water and the wild lands surrounding it are excellent

hunting ground. The effort made some years ago to maintain the maximum elevation of the water level by the construction of a dam where the lake empties into Waccamaw River has been only partially successful, owing perhaps in part to periodic leaking of the dam, but chiefly to deficiency in rainfall. The dam has been repaired two or three times by interested local people assisted by the lake warden, but through the winter and spring of 1932, the water was at an extremely low level. This has greatly interfered with the use of the private docks along the north side of the lake for boating and bathing. It has been possible to maintain a warden at Waccamaw Lake only intermittently.

The experiment of allowing the use of trotlines to the local population during the winter months in this lake was repeated and the reports from permittees emphasize the large number of catfish and other scavenger fish that are taken. In view of the apparent need of the local people for help in furnishing their table, this trotline fishing under paid permit seems to be proving an excellent plan. Nineteen permits were issued in the winter of 1929-30, twenty-six for the winter of 1930-31 and twenty during last winter. Permittees paid \$1 for the permit and agreed to furnish lists of fish caught. These were not always secured, but enough were furnished to give the following average catch:

THREE WINTERS' TROTLINE CATCH AS REPORTED FOR WACCAMAW LAKE BY
NUMBER AND PERCENTAGES

| Kinds of Fish | December and January 1929-30 | | December and January 1930-31 | | December and January 1931-32 | | Averages 3 Winters In Per- centages |
|----------------------------------|---------------------------------------|-----|---------------------------------------|-----|---------------------------------------|-----|--|
| | No. | % | No. | % | No. | % | |
| Catfish..... | 808 | 67 | 1,089 | 67 | 500 | 43 | 60 |
| Blackfish or Grinnel..... | 46 | 4 | 40 | 3 | 120 | 10 | 5 |
| Gars or Gar Pike..... | 30 | 3 | | | 44 | 4 | 2 |
| Eels..... | 79 | 7 | 17 | 2 | 55 | 6 | 4 |
| Terrapin..... | 20 | 2 | 2 | | 11 | 1 | 1 |
| Pike or Jack..... | 6 | 1 | 27 | 2 | 43 | 4 | 2 |
| Black Bass..... | 14 | 1 | 24 | 1 | 14 | 1 | 1 |
| White Perch..... | 112 | 8 | 314 | 19 | 300 | 26 | 18 |
| Goggle Eye..... | 2 | | 24 | 1 | 45 | 4 | 2 |
| Crappie or Speckled Perch..... | | | | | | | |
| Blue Bream..... | | | | | | | |
| Robin or Red Belly..... | | | | | 4 | | |
| Sand Perch or Yellow Breast..... | 11 | 1 | 3 | | | | 1 |
| Redfin or Yellow Perch..... | 85 | 6 | 75 | 5 | 13 | 1 | 4 |
| Grass Perch..... | 4 | | 2 | | | | |
| Totals and Averages..... | 1,217 | 100 | 1,617 | 100 | 1,149 | 100 | 100 |

On account of the low water in the lake, there was some question raised as to the Department's jurisdiction over the part of the lake bottom not covered by water. The Attorney General, however, has ruled that whether

the lake bottom is covered with water or not, the State property line is the normal high water mark. The Wild Life Sanctuary therefore in this and other State lakes includes all of the lake whether water is on it or not.

The effort to close the three tributary creeks emptying into Lake Waccamaw during the breeding season of some of the most important sport fish which habitually nest there failed both in 1931 and 1932. Last spring the water in the lake and creeks was so low that the goggle-eye and other species which usually nest in the overflowed swamp were confined to the creek beds and their consequent slaughter moved some of the more responsible local people to ask that the creeks be closed, but the movement came too late for effective action. However, the sentiment for protection is growing and more effective measures will no doubt shortly be put into force.

The following men have been employed as Lake wardens for the summer months at Waccamaw Lake: Keith Sloan, 1930; A. L. Hendren, 1931; and P. G. Sutton, 1932. Each in his turn has had the use of the Department's outboard motor, but has provided his own boat.

White Lake, with an area of 1,065 acres, has a white sandy bottom and clear water without any tinge of brown such as is found in the other lakes. For many years there has been very poor fishing in this lake, partly because it has been over fished and partly on account of the supposed absence of proper fish food. As one step toward remedying this latter fault, Fred Williams, Assistant State Game Warden, has recently secured as a gift from James L. McNair of Laurinburg some 8,000 top minnows which he put in this lake May 31, 1932. Mr. McNair claims that they increase with great rapidity.

The Department has adopted the definite policy of gradually removing from this lake all closed buildings since it is of supreme importance to maintain the purity of the water. With this purpose in view, no permits will now be issued for the construction or repair of any such closed buildings on the lake. While this policy may interfere with the free use of the lake by some of the surrounding landowners, there seems to be no better way of preserving the essential purity of the water of this closed lake, the most important recreational use of which is for bathing.

The removal of such closed buildings on White Lake as have fallen into disrepair is also being required. This part of the program is being taken up gradually so that no unnecessary financial injury will be worked upon any of the users of the lake. Two old boat houses have been removed partly at the cost of the Department; the removal of others has been requested and will be insisted upon. Eventually the lake will be free from closed buildings so that only docks and open boat houses will be allowed.

The demand by the bathing public that all boats using oil in their operation be prohibited the use of the lake will probably result eventually in doing away with gas engines and fast-moving motor boats on the lake. It is certain that the attractions of this resort would be greatly enhanced were the lake restricted to small craft including canoes, row boats, and sailboats. There is no steady outlet to the lake and in dry seasons, oil spilled on the water undoubtedly accumulates. Certainly the greatest good to the greatest number of users of the lake would be secured by such use.

The warden work has been in general charge of W. R. Whitted, County Game Warden, who also acted as special lake warden during the summers of 1930 and 1932. J. G. Britt was warden from May 15 to September 15, 1931.

Land Policy. The policy of acquiring and setting apart areas of forest and scenic land for the permanent use of the public must contemplate not only purchase by the State in the open market of lands considered necessary for this purpose, but judging by the practice in other states, public spirited citizens may be expected to donate areas or give money for purchase of such areas. The gifts of land to the State not only for recreation, but "to be used so as to demonstrate the practical utility of timber cultivation and water conservation and as refuges for game" is provided for by the State law. Three such gifts have already been made; i.e., Rendezvous Mountain, the Coit land and the Hanes-Lassiter Refuge. There are large amounts of land suitable for timber culture which are now yielding the owner little or nothing, but which under proper management would justify their care. In many cases the owners would feel relieved by transferring submarginal lands to the State and in other cases they would benefit by an added value to adjacent lands. In this way it can be reasonably expected that in the next few years considerable areas may be added to State ownership as State forests or State parks. Again many of the counties are accumulating unprofitable lands on which the owners have been unwilling to pay taxes. Undoubtedly, the counties would benefit if such lands or portions of such property could be turned over to the State to be held permanently, the State contributing a small fee—say $2\frac{1}{2}$ cents per acre per annum—in lieu of taxes. Such a disposition of these delinquent lands would contribute to the stabilization of county revenues. However, the policy of acquisition and improvement somewhat similar to that undertaken by the State of New York may become necessary and advisable in order to put submarginal lands to their best use.

The classification of State lands should show what areas are best adapted to agriculture; what, to private timber production; and what should be finally acquired by the public, federal, state, county, or municipal, and held permanently for public purposes. Such classification is already being undertaken in some of the states and it is thought that if it could be undertaken in North Carolina, it would help solve many of our largest land and tax problems.

GENERAL FORESTRY

Education. Perhaps the most important function of the Forestry Division is education or the conversion of the public from a position of indifference and carelessness to one of responsibility for the perpetuation of our forest resources for all the benefits which a productive and perpetual forest cover will insure. The work of forest protection is in large part a work of education, while forest planting is justified in North Carolina quite as much from a point of education as for the actual reestablishment of the forest cover which results. Every opportunity is seized to reach the public and especially the younger generation with information and appeal, yet our field is most discouragingly restricted by lack of means. It is difficult to point to any definite results over a two-year period, yet in looking back

over two decades distinct advance is apparent. Even in the eastern region where the habit of indiscriminate burning over of uncultivated areas has lingered the longest and the educational work was begun scarcely ten years ago, a decided change has been brought about in the attitude of the better informed citizens. However, like most of the money spent for conservation, the results will show more in the future than in the present.

The following activities are examples of the educational efforts of the Division during the biennium. Through the coöperation of the United States Forest Service which bore all of his expenses, H. N. Wheeler spent a week, March 9-14, 1931, in North Carolina, filling lecture engagements which had been arranged beforehand by the State Forester. Accompanied by Assistant Forester Claridge he gave illustrated lectures on conservation of forests, waters, and wild life at the following colleges and high schools: Burlington, Guilford College, North Carolina College for Women, Winston-Salem, Catawba College, Statesville, Salisbury, Concordia College, Davidson College, Winston-Salem Teachers College, and the Winston-Salem Civitan Club. More than 4,000 people heard Mr. Wheeler with his infectious enthusiasm on this trip.

Carolina Forest Week, which includes Arbor Day (the first Friday after the 15th of March) was utilized by all sections of the Forestry Division for making contacts with the public through radio addresses, the distribution of suitable publications, the appearance of the forest wardens at schools, and the encouragement of special school programs. Through lack of funds these activities had to be considerably reduced in 1932. Radio programs in both years included talks by the State Forester, Paul Kelly, F. H. Claridge, C. H. Flory and Grace White. Some of these addresses were forwarded to Charlotte and Asheville to be repeated there as opportunity offered. This year a unique feature was made possible by the publication of a special Arbor Day postage stamp to commemorate the sixtieth anniversary of the first Arbor Day established in Nebraska by J. Sterling Morton. Five thousand of these Arbor Day stamps were purchased and a mimeographed stuffer calling attention to this stamp used in that many envelopes containing checks for fire fighters. These went chiefly to counties having protection, but also quite largely with general mail.

Another field for educational work is the boys' and girls' camps throughout the State. A few such camps are visited each summer by one or more of the technical force. However, the larger number can only be reached at intervals of three or four years. A dozen such camps were visited and illustrated lectures given by the State Forester. Identification of trees was also demonstrated in brief woods hikes at some of them.

Vocational Forestry. At the request of the officials in charge of vocational education a plan of instruction in forestry has been formulated and Mr. Claridge has prepared a series of lessons which will be given by the vocational agricultural teachers in the high schools to students in those schools who qualify for this work. Each student taking the course will be required to have available from one to three acres of land supporting different types of forest growth or land which can be planted to trees. For the present practically all of the work at the school will have to be done

by the regular agricultural teacher, but later on as funds become available the Department will furnish part-time services of one or more of its technical men for directing this very important work. There are some 185 high schools in the state where vocational agriculture is taught and these courses should be available to students in any or all of these schools. Similar work has been developed in Georgia, Mississippi and South Carolina and there is equal or even greater need for it in this State.

Essay Contest. Through coöperation of the American Forestry Association, and, in the past year, of the North Carolina Forestry Association, both of which furnished prizes, high school essay contests have been conducted each spring following the first of this series in 1930. The subject of the second contest was, "A New Land Policy for North Carolina," and some 40 essays, the pick of fifteen or twenty counties, were submitted. The winners were Christiana McFayden, Marvin Doyle Harris, Richard Miller, Edna Patton, Marjorie Chambers, and David Odom. In the spring of 1932 the subject was "The Relation of Forestry to Our Fish and Game," a topic suggested by the Izaak Walton League. Some thirteen pages of mimeographed material was prepared and sent on request to over 1,300 children in the State. Nearly fifty essays were received in the office and were carefully graded by a committee of the Forestry Division. The following were winners in the contest: Edward Eaton, Eugenia Avery, Rebecca Highsmith, Virginia Crow, Blanche Hamrick, Norman West, Grace Taylor, Leonard Dunavant, and Marguerite Green. The prizes were a plaque and medals offered by the American Forestry Association, and six cash prizes. These were presented to the winners so far as possible at the high school commencements.

Meetings. One or more of the technical force of the Forestry Division represented the Department at the following meetings with the idea of contributing a special address or coöperative advice and bringing back new and helpful ideas for the progress of the work: The Society of American Foresters, annual meeting, Washington, D. C., December 29, 1931; The Appalachian Section, Society of American Foresters, Asheville, January 24, 1931, and Raleigh, January 31, 1932; the American Forestry Association, annual meeting in coöperation with North Carolina Forestry Association, Asheville, June 3, 1931; the Appalachian Forest Research Council, Asheville, June 2, 1931, and June 17, 1932; National Conference on State Parks, Virginia Beach, Virginia, May 5-7, 1932; North Carolina Conference on Social Service, Greensboro, 1931 and Durham, 1932; Association of State Foresters, Georgia and Florida, November 16-19, 1931, on which occasion the State Forester made the presentation address at a celebration at the University of Florida; the South Carolina Commercial Forestry Conference, January 21-22, 1931; and the Georgia Forestry Association, Rome, Georgia, June 22, 1932. The State Forester was elected Vice Chairman of the Forestry Committee of the Southern Agricultural Workers and is a member of the Forestry Committee of the Southern Economic Council. He has also taken an active part in plans to continue the publicity and educational work of the Southern Forestry Congress. Both he and Mr. Flory are members of the Executive Committee of the North Carolina Forestry Association, the former being a Director and the latter Treasurer.

Probably the most fruitful educational efforts that can be carried on are lectures at teachers' training schools. It is to be regretted that more of this has not been done. The difficulty of arranging suitable dates and the expense incident to travel has held this phase of the work down to a minimum; however, Mr. Claridge in July, 1931, lectured at Davidson College, Catawba College, and Winston-Salem Teachers' College thereby conveying a forestry message to some 500 teachers.

The Forestry Division took its turn on the weekly radio program, made possible through the courtesy of WPTF of Raleigh, where the State Forester and the two Assistant Foresters gave radio talks. Occasional talks were also given at Asheville by the District Forester and at Charlotte by the County Game Warden.

Other addresses by this administrative staff were made before the high school students at Cary, Selma, Louisburg, Raeford, Raleigh, Lillington, Youngsville, and Goldsboro.

Publications. In October, 1930, the folder on the Fort Macon State Park was compiled by F. H. Claridge in which a brief history of the Fort was given and the birds and plant life found on the park property were named. A map was also included to show how to reach the Fort and the vicinity of the Fort was described. This is a companion folder to the one on the Mount Mitchell State Park and vicinity, which was printed in May, 1930. These folders are sold for 5 cents each and some little revenue has already been derived from their sale. Other publications have had to be issued in mimeographed form owing to the lack of printing funds. These include small studies on "The Pulpwood Industry in North Carolina," "The Veneer Industry," "An Outline of Conservation" and material for each essay contest.

A questionnaire which involved considerable study and brought out interesting and valuable opinions was related to the use of bloodhounds in apprehending offenders against the forest fire laws. Our very limited though extremely interesting experience along this line during the past year suggested the inquiry as to the attitude and practice of Forestry Departments in other states. The reports from twenty-four states having Forestry Departments seem to justify the conclusions that, in most cases, resort to bloodhounds in this work will be disappointing and that the practice will be gradually abandoned as educational work proceeds.

Coöperation. The relation of the several agencies of the United States Forest Service with this Department continue on the most friendly and mutually helpful basis. Outside of the liberal financial coöperation received for forest fire prevention and forest planting work, the National Forest Administration, the Appalachian Forest Experiment Station with its advisory Research Council, the Southern Forest Experiment Station which operated to some extent in eastern North Carolina, and the Forest Products Laboratory all contribute to the educational and investigative work in the State.

Through the coöperation of the United States Forest Service and the United States Weather Bureau a fire weather forecast station has been established at Asheville and L. T. Pierce was placed in charge of this service March 7, 1932. He plans to secure daily reports from selected observation

stations in the Mountain Region, one of which will be Mount Mitchell. It is hoped that forecasts of especially hazardous fire weather can be made far enough in advance to be of great service in forest fire control work.

A most interesting and helpful report was issued in January, 1932, being Report No. 17 of the Forest Taxation Inquiry dealing with taxation of forest property in North Carolina, by Paul W. Wager and Roy B. Thomson. This is a report of a study of taxation made in 1930 with special reference to forest lands in three counties representing the three chief forest regions of the State, Beaufort, Chatham and Macon counties. While this report has not officially been published, the mimeographed text with the photostat tables makes a most convenient volume for study and reference. Much information on the quality, condition, yield and comparative value of the various types of land in these counties is here brought together for the first time.

Legislation. While several proposed measures looking to the strengthening of our forest fire laws were prepared for the consideration of the General Assembly of 1931, only two bills relating directly to the work of the Forestry Division were introduced. One bill asked that counties allowing forest fires to start without effort at control and then to cross the boundary line into counties which had made appropriations to cooperate with the State in fire prevention should be responsible for the cost of suppression rather than the counties which were invaded by the fire. This bill received a favorable report by the newly organized Conservation Committee, but further action was unfavorable. A second measure, amending the law regarding the administration of State parks so as to make regulations enforceable, was acted upon favorably and has become part of the State law. Unfortunately, the vote of the people on the proposed Constitutional amendment providing for the classification of property for taxation, which would have opened the way for further legislation on the taxation of forest lands, was defeated in the general election of November, 1930. The subsequent appointment by the General Assembly of a Constitutional Commission will, it is hoped, result in bringing in a recommendation for such a change in the Constitution.

An Educational Program. Education of the people of the State along all lines of conservation and especially in forestry and all its relationships to our other natural resources is the chief work of the Forestry Division and the extension of such education is its chief need. Since motion pictures are probably the chief educational force today, the practice of sending the motion picture truck to rural schools showing forestry and wild life pictures should be resumed and another truck added. Illustrated lectures should be available for the high schools, and more technical instruction on conservation should be presented at teacher training schools. Boys' and girls' camps also furnish exceptional opportunities for instruction in the elements of forestry on the ground. Instruction through the teachers of vocational agriculture in the high schools, already being started, should be greatly extended. To aid in these approaches and to reach other fields, the preparation and publication of popular pamphlets and leaflets for general or special distribution is necessary. The relation of our forests to soil erosion, to the

protection of water supplies, to wild life conservation and management, to scenic beauty and to recreation must be put across intelligently and persistently if our once abundant natural resources are to be used wisely and profitably and perpetuated for the benefit of future citizens. The supreme importance of this program calls for the employment of an educated and experienced man with forestry and general conservation training, one who can write and speak effectively, to head up this work.

DIVISION OF GAME

ORIGIN OF GAME PROGRAM

In submitting the Game Division's section of the Fourth Biennial Report of the Department of Conservation and Development, it is well perhaps to consider briefly early wild life conditions and then some of the more recent considerations leading up to the passage of the North Carolina Game Law in 1927.

There is no way of knowing positively the debt that the world owes to the many forms of wild life that serve man and minister to his needs.

The story of creation as related in the Biblical chapter of Genesis tells that the heavens and the earth were created; then came the lower forms of animal life; and finally man was placed upon the earth and given dominion over all living things.

Peering back through the mists of earliest recorded history, modern man visualizes his forebears as wild cave-dwellers living off of an abundance of wild life and plants. His methods of pursuing or ensnaring his prey were crude, but nevertheless he was able to sustain life by means of his superior intellect and skill.

The love of the chase has continued as second nature to man even after advancing civilization relieved him of entire dependence upon wild animals, fish, and plants. Until this day, man still nurtures in his breast a genuine joy in pursuit of wild life. This characteristic is partly an inheritance from his forefathers and a natural fondness to test his skill by seeking anything that tries to elude him.

Our own country owes a debt to wild life that is not fully appreciated. When the early settlers arrived on American soil they relied largely upon wild animals and birds for their food supply.

With the abundance of wild life found by the early settlers, it is no wonder that following generations could not foresee a depletion of the supply. The extravagance with which the pioneers took of animal and bird life persisted through these generations. Evidences of this destruction include the extinction of the carrier pigeon, the merciless slaughter of the American bison, and the reduction of the sage hen to a lone survivor.

Until a comparatively few years ago, wild life was apparently so plentiful in North Carolina that only the most far-seeing realized that the resource was exhaustible. The very plentitude of useful birds and animals was doubtless a factor in the persistence of a complacent attitude on the part of a majority. As the picture changed with more modern conditions, those who had been considered visionary in warnings of a probable depletion of wild life were more respected for their foresight.

An early group of conservation enthusiasts was joined by sportsmen throughout the State and thus began organized efforts to obtain a State-wide game law. These pioneers in the movement were often set back, but never discouraged to the point of surrendering their principles. Their efforts extended over approximately a quarter of a century.

Previous to the adoption of the State law, a patchwork of county laws was passed, representing the only hunting regulations in North Carolina.

These county laws were of such a variety that the situation was one of constant bewilderment to those who participated in the sport. A hunter might respect fully all provisions of the law in one county, but in stepping over the county line he became a violator. The confusion of so many different sets of regulations made it almost an impossibility for a hunter to keep within the law.

At last success crowned the efforts over a long period of years to obtain a State-wide Game Law, and North Carolina placed itself alongside other states in real efforts to reclaim and build up its useful wild life resources. To the General Assembly of 1927 belongs the credit for enactment of the measure which had the active and influential support of the Hon. A. W. McLean, then Governor of the State, and the hearty coöperation of Major Wade H. Phillips, at that time director of the Department of Conservation and Development.

Governor McLean, at whose instigation the Department of Conservation and Development was created in 1925, recommended passage of a State Game Law as part of his legislative program in his message to the General Assembly in 1927. His support furnished much of the needed influence in obtaining its passage. During the present administration, Governor Gardner has likewise exhibited a deep interest in and active support of the Department program in the administration of the provisions of the act.

Under the State Law, a definite policy of game conservation took the place of a crazy-quilt of laws applying to individual counties. The State law afforded a unity and effectiveness of game conservation which was impossible under former conditions. It also brought a permanency which enabled the adoption of constructive measures for game rehabilitation; and equally as important, it provided means for carrying out these plans.

Although among the last to launch a State-wide game program, North Carolina did not lag behind in its administration; but began immediately to take steps to turn the trend from depletion of game supplies to rehabilitation.

Major Phillips undertook the work of State Game Warden in addition to his duties as Director of the Department of Conservation and Development. He organized the first warden system, established the first policies of administration with the approval of the Board of Conservation, and saw the law through the difficult days of its early history. The first State Game Warden served more than a year in this dual role, until succeeded by the incumbent in September, 1928.

The same legislature which passed the State Game Law also merged the old Fisheries Commission Board with the Department of Conservation and Development. Functions exercised by the Fisheries Board were placed under two separate Divisions, Commercial and Inland Fisheries. Operation of the State fish hatcheries and other features of the inland fisheries program were assigned to the Inland Fisheries Division. The State's forestry program was already administered by the Conservation Department through its Division of Forestry. Three closely related fundamental conservation activities were thus, by authorization of the 1927 General Assembly, brought under the administration of one Department.

Close coöperation between the game, inland fisheries, and forestry phases of conservation has resulted in substantial economies and efficiency of

operation. Instead of three separate field forces, it has been necessary to organize only one with the same field officer serving in all cases as game and fish warden; and with few exceptions, the same officer is also forest warden.

The consolidation of the warden force provided means for the enforcement of inland fisheries regulations that would not otherwise have existed except by direct appropriations. Revenue from anglers' licenses have not been sufficient to supply a warden service after supporting the State fish hatcheries, but administration of regulations governing inland fishing has been made possible through consolidation of game and fish warden services. The close association of the game and fish programs makes it convenient and efficient to do this.

Since the inauguration of the game program, the Department of Conservation and Development has realized that desired results could not be obtained without the coöperation of the public, particularly that portion that is deeply interested in wild life. The Division is indebted to sportsmen of the State for their consistent and helpful support. An overwhelming majority has stood squarely behind the Department in legislative and administrative matters.

From the beginning, the game administrative policy has been built around the idea that the *fullest measure of success* of the law depends upon *the degree of support received from the public*, and hence the educational appeal has at all times occupied a prominent place in the undertaking.

REVIEW OF BIENNIAL ACTIVITIES

For the purpose of convenience and clarity, this section of the Biennial Report is assembled under three main headings: (1) Law Enforcement, (2) Propagation, and (3) Education. All the activities of the Division may properly be classified under these headings.

1. **Law Enforcement.** The success or failure of any law depends upon the type of personnel to which it is entrusted. Since the administration of the game law includes much more than the enforcement of regulatory features, the need of a warden service of the highest class is emphasized.

Officials of the Department of Conservation and Development have sought to build a warden service that would devote a substantial part of its efforts toward constructive conservation of game life. To enforce the game law rigidly would not in itself assure successful operation. The final goal of the service is to obtain complete law observance on the part of the public by convincing it of the fact that the law was enacted for and is the basis of protection for a resource in which every North Carolinian is a stockholder. Thus the warden is not only cast in the role of a detective and law officer, but also as a diplomat and a practical game protector and educator.

The loyalty and interest of the wardens received their hardest test during this biennium, but they fully justified the confidence which has been placed in them. Faced by decreased collections from hunting licenses, it was necessary early in 1932 to make drastic cuts in the pay of wardens, amounting to an average of approximately 60 per cent. This step was made necessary even after the number of wardens had been reduced from 100 to approximately 75 in number.

To the credit of the warden organization this drastic cut did not destroy its morale, but it carried on under the trying conditions with undiminished zeal, exhibiting a personal interest in the work beyond the financial remuneration. After accomplishing the necessary savings, the Division plans to restore the wardens to a scale of pay more in keeping with the duties which they are called upon to perform. In explanation of the seeming disproportionate cut in pay, it is well to state that the scale of compensation of the wardens was upheld longer than that of other public officials and employees, and it became necessary to affect savings within a few months that would ordinarily have been spread over an entire year.

That the activities of the wardens have held up well is attested by the report of prosecutions for the biennial period ending June 30, 1932. During these two years, 2,779 violators of the game laws have been convicted as compared with 3,415 for the previous biennium. Fines amounting to approximately \$6,000 were assessed against the offenders, and court costs approximating \$16,000 were paid. The warden force was also responsible for almost a like number of convictions for violations of inland fisheries regulations during the same period.

GAME LAW PROSECUTIONS DURING BIENNUM, 1930-32

| | No. Cases | Fines | Costs |
|-------------------------------------|-----------|-------------|--------------|
| July 1, 1930, to June 30, 1931..... | 1,530 | \$ 3,721.05 | \$ 11,720.60 |
| July 1, 1931, to June 30, 1932..... | 1,249 | 2,231.06 | 4,172.21 |
| Total..... | 2,779 | \$ 5,952.11 | \$ 15,892.81 |

A considerable measure of success of game law administration may rightfully be assigned to the force of deputy wardens, numbering approximately 1,600. These deputies serve without pay, being largely composed of sportsmen desiring to contribute their part to the conservation of game. All of the deputies are selected with care and are appointed on recommendation of the county wardens to whom they are responsible. Through the services of these deputies, a more thorough enforcement of game laws is made possible than could be hoped for through the individual efforts only of the paid county wardens. Not only has this force been instrumental in apprehending violators, but it has exercised a deterring effect on would-be evaders of the law. These deputies have also been a valuable force in the Division's educational program through personal contacts.

Coöperation with Inland Fisheries and Forestry Divisions. As has been mentioned heretofore, close coöperation is maintained between the Division of Game and the Divisions of Inland Fisheries and Forestry. The inclusion of these three phases of conservation activities under the same Department has strengthened each Division and enabled substantial economies to be made in administration.

Under the State game law, close coöperation is required between these branches of the conservation service, and each warden in the three Divisions is an ex officio warden in the other service.

All peace officers of the State are also made ex officio game wardens under

the game law. The Division is glad to give public acknowledgment to an increased interest on the part of the general peace officers in the various phases of conservation. A reluctance on the part of some of the peace officers in some counties to assist actively in game law enforcement is steadily turning into a desire to coöperate as public interest in the movement is attested.

Game Division Funds. The State Game Warden is required by statute to make a report of receipts from hunting licenses by counties as well as of expenditures. Following is a table listing receipts by counties for each of the fiscal years of the biennium:

SALE OF HUNTING LICENSES FOR SEASON 1930-1931

| County | Non-resident | State | County | Total Receipts | Fur Dealers |
|-----------------|--------------|-------|--------|----------------|-------------|
| Alamance..... | 28 | 545 | 1,479 | \$ 3,565.25 | \$ 0 |
| Alexander..... | 0 | 60 | 167 | 359.00 | 10.00 |
| Alleghany..... | 0 | 18 | 212 | 282.50 | 0 |
| Anson..... | 2 | 58 | 705 | 947.50 | 0 |
| Ashe..... | 0 | 10 | 530 | 763.25 | 20.00 |
| Avery..... | 0 | 63 | 283 | 460.75 | 10.00 |
| Beaufort..... | 33 | 326 | 1,680 | 3,458.25 | 30.00 |
| Hyde..... | 1 | 38 | 405 | 612.25 | 20.00 |
| Bertie..... | 12 | 190 | 1,497 | 2,380.00 | 80.00 |
| Bladen..... | 9 | 142 | 1,003 | 1,646.25 | 50.00 |
| Brunswick..... | 4 | 57 | 476 | 747.00 | 30.00 |
| Buncombe..... | 11 | 844 | 2,572 | 4,535.25 | 30.00 |
| Burke..... | 2 | 144 | 911 | 1,391.25 | 10.00 |
| Cabarrus..... | 0 | 264 | 383 | 1,241.25 | 0 |
| Caldwell..... | 0 | 155 | 1,038 | 1,533.25 | 10.00 |
| Camden..... | 15 | 93 | 397 | 1,046.00 | 10.00 |
| Carteret..... | 118 | 106 | 687 | 2,776.50 | 10.00 |
| Caswell..... | 18 | 59 | 480 | 942.75 | 0 |
| Catawba..... | 2 | 382 | 1,083 | 2,368.50 | 0 |
| Chatham..... | 91 | 148 | 640 | 2,475.75 | 0 |
| Cherokee..... | 2 | 142 | 531 | 989.50 | 0 |
| Chowan..... | 2 | 76 | 284 | 597.25 | 95.00 |
| Clay..... | 0 | 6 | 175 | 195.25 | 0 |
| Cleveland..... | 0 | 286 | 995 | 1,847.00 | 0 |
| Columbus..... | 48 | 177 | 1,181 | 2,516.75 | 205.00 |
| Craven..... | 46 | 465 | 1,516 | 3,823.00 | 250.00 |
| Cumberland..... | 6 | 415 | 894 | 2,364.75 | 175.00 |
| Currituck..... | 40 | 31 | 363 | 1,191.50 | 30.00 |
| Dare..... | 0 | 4 | 22 | 48.50 | 0 |
| Davidson..... | 42 | 377 | 1,093 | 2,867.50 | 0 |
| Davie..... | 2 | 128 | 833 | 1,267.75 | 0 |
| Duplin..... | 12 | 327 | 1,307 | 2,536.50 | 70.00 |
| Durham..... | 3 | 1,196 | 869 | 4,550.25 | 0 |
| Edgecombe..... | 9 | 692 | 1,521 | 3,972.50 | 165.00 |
| Forsyth..... | 2 | 1,661 | 1,537 | 6,717.00 | 85.00 |
| Franklin..... | 1 | 90 | 920 | 1,246.50 | 0 |
| Gaston..... | 0 | 597 | 1,006 | 2,799.00 | 0 |
| Gates..... | 8 | 69 | 560 | £98.00 | 40.00 |
| Graham..... | 11 | 32 | 345 | 624.00 | 0 |
| Granville..... | 11 | 75 | 468 | 870.00 | 0 |
| Greene..... | 0 | 112 | 588 | 1,003.75 | 0 |
| Guilford..... | 35 | 1,730 | 1,677 | 7,514.75 | 125.00 |
| Halifax..... | 16 | 424 | 1,826 | 3,451.25 | 265.00 |
| Harnett..... | 34 | 298 | 776 | 2,252.25 | 0 |
| Haywood..... | 7 | 171 | 964 | 1,586.25 | 0 |

SALE OF HUNTING LICENSES FOR SEASON 1930-1931—Continued

| County | Non- resident | State | County | Total Receipts | Fur Dealers |
|-------------------|------------------|--------|--------|-------------------|----------------|
| Henderson..... | 4 | 139 | 854 | 1,273.00 | 10.00 |
| Hertford..... | 12 | 124 | 761 | 1,370.50 | 50.00 |
| Hoke..... | 0 | 71 | 115 | 684.00 | 0 |
| Iredell..... | 2 | 252 | 1,235 | 2,069.50 | 0 |
| Jackson..... | 2 | 34 | 276 | 409.75 | 0 |
| Johnston..... | 4 | 261 | 2,362 | 3,292.00 | 10.00 |
| Jones..... | 6 | 89 | 526 | 956.25 | 20.00 |
| Lee..... | 6 | 184 | 445 | 1,124.75 | 0 |
| Lenoir..... | 8 | 514 | 807 | 2,671.25 | 135.00 |
| Lincoln..... | 0 | 116 | 267 | 629.75 | 0 |
| Macon..... | 0 | 40 | 481 | 477.00 | 0 |
| Madison..... | 0 | 0 | 351 | 351.00 | 0 |
| Martin..... | 1 | 237 | 1,087 | 1,967.25 | 70.00 |
| McDowell..... | 0 | 137 | 594 | 1,018.00 | 0 |
| Mecklenburg..... | 0 | 922 | 1,553 | 4,362.25 | 0 |
| Mitchell..... | 8 | 66 | 537 | 865.00 | 0 |
| Montgomery..... | 3 | 98 | 240 | 590.75 | 0 |
| Moore..... | 66 | 275 | 555 | 2,458.25 | 0 |
| Nash..... | 2 | 498 | 1,544 | 3,184.50 | 0 |
| New Hanover..... | 11 | 749 | 377 | 2,820.75 | 150.00 |
| Northampton..... | 2 | 58 | 1,384 | 1,750.00 | 115.00 |
| Onslow..... | 37 | 125 | 964 | 2,031.25 | 60.00 |
| Orange..... | 0 | 242 | 751 | 1,520.25 | 0 |
| Pamlico..... | 24 | 93 | 350 | 1,055.00 | 0 |
| Pasquotank..... | 6 | 254 | 400 | 1,311.75 | 115.00 |
| Pender..... | 31 | 97 | 1,014 | 1,805.75 | 0 |
| Perquimans..... | 10 | 26 | 328 | 604.00 | 10.00 |
| Person..... | 12 | 77 | 792 | 1,236.50 | 0 |
| Pitt..... | 3 | 564 | 1,478 | 2,620.25 | 0 |
| Polk..... | 1 | 26 | 211 | 304.00 | 0 |
| Randolph..... | 83 | 289 | 779 | 2,940.50 | 10.00 |
| Richmond..... | 2 | 184 | 187 | 888.00 | 115.00 |
| Robeson..... | 8 | 334 | 1,106 | 2,311.50 | 80.00 |
| Rockingham..... | 1 | 340 | 2,005 | 3,059.50 | 0 |
| Rowan..... | 6 | 342 | 635 | 1,787.75 | 0 |
| Rutherford..... | 0 | 149 | 926 | 1,416.75 | 0 |
| Sampson..... | 0 | 136 | 1,359 | 1,853.25 | 20.00 |
| Scotland..... | 2 | 93 | 346 | 694.00 | 0 |
| Stanly..... | 0 | 132 | 284 | 699.25 | 0 |
| Stokes..... | 0 | 62 | 730 | 748.25 | 0 |
| Surry..... | 2 | 164 | 968 | 1,599.25 | 0 |
| Swain..... | 3 | 31 | 193 | 333.00 | 0 |
| Transylvania..... | 5 | 33 | 318 | 497.00 | 10.00 |
| Tyrrell..... | 0 | 0 | 24 | 24.00 | 0 |
| Union..... | 0 | 84 | 914 | 1,197.25 | 0 |
| Vance..... | 4 | 260 | 808 | 1,680.00 | 0 |
| Wake..... | 3 | 985 | 2,041 | 5,231.00 | 0 |
| Warren..... | 3 | 122 | 1,472 | 1,925.63 | 0 |
| Washington..... | 4 | 103 | 316 | 782.75 | 70.00 |
| Watauga..... | 0 | 55 | 653 | 861.75 | 20.00 |
| Wayne..... | 3 | 380 | 1,307 | 2,613.25 | 170.00 |
| Wilkes..... | 0 | 83 | 899 | 1,168.50 | 20.00 |
| Wilson..... | 4 | 536 | 1,541 | 3,278.50 | 0 |
| Yadkin..... | 0 | 83 | 582 | 842.75 | 0 |
| Yancey..... | 0 | 41 | 372 | 496.00 | 0 |
| Grand Total..... | 1,077 | 24,682 | 82,291 | \$177,100.38 | \$ 3,085.00 |

SALE OF HUNTING LICENSES FOR SEASON 1931-1932

| County | Non-resident | State | County | Total Receipts | Fur Dealers |
|-----------------|--------------|-------|--------|----------------|-------------|
| Alamance..... | 15 | 372 | 1,008 | \$ 2,404.25 | 0 |
| Alexander..... | 3 | 113 | 858 | 1,254.75 | 10.00 |
| Alleghany..... | 0 | 26 | 330 | 442.25 | 0 |
| Anson..... | 8 | 48 | 543 | 851.00 | 0 |
| Ashe..... | 1 | 11 | 613 | 678.75 | 10.00 |
| Avery..... | 0 | 62 | 308 | 514.00 | 0 |
| Beaufort..... | 17 | 285 | 1,143 | 2,392.00 | 135.00 |
| Bertie..... | 2 | 74 | 628 | 903.25 | 50.00 |
| Bladen..... | 6 | 121 | 640 | 1,096.75 | 30.00 |
| Brunswick..... | 1 | 67 | 485 | 729.50 | 10.00 |
| Buncombe..... | 5 | 873 | 2,614 | 5,343.00 | 85.00 |
| Burke..... | 0 | 115 | 513 | 887.25 | 0 |
| Cabarrus..... | 0 | 281 | 462 | 1,366.75 | 0 |
| Caldwell..... | 0 | 109 | 627 | 970.75 | 0 |
| Camden..... | 12 | 47 | 300 | 719.75 | 10.00 |
| Carteret..... | 32 | 27 | 184 | 749.00 | 0 |
| Caswell..... | 6 | 18 | 218 | 364.75 | 0 |
| Catawba..... | 0 | 269 | 585 | 1,440.25 | 0 |
| Chatham..... | 54 | 138 | 484 | 1,726.50 | 0 |
| Chowan..... | 0 | 25 | 92 | 172.50 | 0 |
| Cherokee..... | 3 | 281 | 339 | 683.00 | 0 |
| Clay..... | 0 | 2 | 89 | 95.00 | 0 |
| Cleveland..... | 0 | 217 | 762 | 1,434.50 | 0 |
| Columbus..... | 35 | 138 | 716 | 1,318.75 | 205.00 |
| Craven..... | 29 | 351 | 1,160 | 2,760.50 | 305.00 |
| Cumberland..... | 6 | 344 | 774 | 1,983.50 | 145.00 |
| Currituck..... | 23 | 11 | 303 | 775.00 | 10.00 |
| Dare..... | 0 | 2 | 41 | 68.75 | 0 |
| Davidson..... | 9 | 222 | 873 | 1,690.50 | 0 |
| Davie..... | 0 | 106 | 718 | 1,053.50 | 0 |
| Duplin..... | 7 | 230 | 723 | 1,549.25 | 40.00 |
| Durham..... | 0 | 928 | 752 | 3,581.00 | 0 |
| Edgecombe..... | 8 | 527 | 1,052 | 2,897.25 | 30.00 |
| Forsyth..... | 1 | 1,319 | 1,517 | 5,638.25 | 10.00 |
| Franklin..... | 0 | 62 | 509 | 711.75 | 0 |
| Gaston..... | 0 | 426 | 691 | 1,976.50 | 0 |
| Gates..... | 12 | 48 | 388 | 770.25 | 50.00 |
| Graham..... | 3 | 19 | 236 | 338.00 | 0 |
| Granville..... | 8 | 83 | 446 | 823.75 | 0 |
| Greene..... | 0 | 73 | 329 | 610.50 | 0 |
| Guilford..... | 25 | 1,296 | 1,123 | 5,485.75 | 125.00 |
| Halifax..... | 19 | 370 | 1,109 | 2,573.00 | 0 |
| Harnett..... | 39 | 210 | 585 | 1,855.50 | 10.00 |
| Haywood..... | 13 | 148 | 557 | 1,399.75 | 0 |
| Henderson..... | 0 | 169 | 849 | 1,361.75 | 10.00 |
| Hertford..... | 9 | 100 | 519 | 992.25 | 50.00 |
| Hoke..... | 0 | 65 | 62 | 487.50 | 0 |
| Hyde..... | 1 | 13 | 280 | 364.75 | 0 |
| Iredell..... | 0 | 119 | 619 | 1,015.00 | 0 |
| Jackson..... | 0 | 43 | 370 | 499.00 | 0 |
| Johnston..... | 0 | 184 | 1,820 | 2,476.25 | 0 |
| Jones..... | 8 | 61 | 429 | 781.00 | 10.00 |
| Lee..... | 1 | 92 | 204 | 513.50 | 0 |
| Lenoir..... | 6 | 353 | 459 | 1,760.50 | 200.00 |
| Lincoln..... | 0 | 72 | 251 | 488.00 | 0 |
| Macon..... | 0 | 27 | 428 | 509.00 | 0 |
| Madison..... | 0 | 21 | 431 | 494.00 | 0 |

SALE OF HUNTING LICENSES FOR SEASON 1931-1932—Continued

| County | Non-resident | State | County | Total Receipts | Fur Dealers |
|-------------------|--------------|--------|--------|----------------|-------------|
| Martin..... | 1 | 154 | 650 | \$ 1,193.00 | \$ 40.00 |
| McDowell..... | 0 | 103 | 438 | 755.75 | 0 |
| Mecklenburg..... | 0 | 708 | 1,357 | 3,511.50 | 0 |
| Mitchell..... | 0 | 54 | 405 | 573.25 | 0 |
| Montgomery..... | 2 | 94 | 238 | 591.00 | 0 |
| Moore..... | 42 | 201 | 438 | 1,724.25 | 0 |
| Nash..... | 1 | 370 | 1,026 | 2,226.75 | 0 |
| New Hanover..... | 3 | 541 | 290 | 1,985.50 | 75.00 |
| Northampton..... | 8 | 33 | 1,084 | 1,376.50 | 105.00 |
| Onslow..... | 21 | 88 | 613 | 1,249.50 | 20.00 |
| Orange..... | 2 | 212 | 646 | 1,468.00 | 0 |
| Pamlico..... | 17 | 80 | 231 | 532.75 | 0 |
| Pasquotank..... | 5 | 114 | 200 | 673.50 | 125.00 |
| Pender..... | 0 | 53 | 399 | 574.50 | 0 |
| Perquimans..... | 10 | 13 | 208 | 420.50 | 0 |
| Person..... | 5 | 26 | 420 | 586.25 | 0 |
| Pitt..... | 0 | 341 | 684 | 1,714.25 | 105.00 |
| Polk..... | 0 | 75 | 161 | 236.00 | 0 |
| Randolph..... | 66 | 222 | 271 | 2,164.75 | 20.00 |
| Richmond..... | 0 | 176 | 453 | 1,006.75 | 115.00 |
| Robeson..... | 38 | 241 | 840 | 2,245.50 | 50.00 |
| Rockingham..... | 0 | 279 | 1,832 | 2,686.25 | 0 |
| Rowan..... | 1 | 322 | 687 | 1,707.75 | 0 |
| Rutherford..... | 0 | 144 | 726 | 1,192.75 | 0 |
| Sampson..... | 0 | 51 | 440 | 611.00 | 70.00 |
| Scotland..... | 2 | 64 | 230 | 472.25 | 0 |
| Stanly..... | 7 | 171 | 389 | 1,026.75 | 0 |
| Stokes..... | 0 | 9 | 103 | 136.25 | 0 |
| Surry..... | 0 | 130 | 807 | 1,208.25 | 0 |
| Swain..... | 2 | 44 | 199 | 361.00 | 0 |
| Transylvania..... | 3 | 39 | 339 | 507.25 | 10.00 |
| Tyrrell..... | 0 | 15 | 227 | 303.75 | 10.00 |
| Union..... | 0 | 63 | 583 | 783.25 | 0 |
| Vance..... | 1 | 225 | 956 | 1,684.50 | 75.00 |
| Wake..... | 0 | 394 | 671 | 1,918.00 | 0 |
| Warren..... | 2 | 94 | 1,022 | 1,376.75 | 0 |
| Washington..... | 4 | 76 | 339 | 646.00 | 90.00 |
| Watauga..... | 0 | 43 | 634 | 794.50 | 0 |
| Wayne..... | 1 | 310 | 938 | 2,025.50 | 125.00 |
| Wilkes..... | 0 | 90 | 580 | 879.25 | 20.00 |
| Wilson..... | 1 | 372 | 1,088 | 2,231.50 | 0 |
| Yadkin..... | 0 | 45 | 383 | 519.75 | 0 |
| Yancey..... | 0 | 8 | 178 | 202.00 | 0 |
| Grand Total..... | 672 | 18,700 | 59,511 | \$128,913.00 | \$ 2,605.00 |

Song and Insectivorous Birds. Under the State Game Law, all birds with the exception of those classified as "Unprotected" and "Game" are protected. This third group includes the songsters, the insectivorous, and birds of plumage.

The Division has continuously impressed upon the wardens that the protection of these birds is an important part of their duty. Except at rare intervals, it has not been necessary to invoke the power of the law to prevent the slaughter of these innocent and valuable creatures since the

Division is happy to report that there is a growing appreciation of this part of our wild life population.

During the spring of 1932, it was the privilege of the State Game Warden to deliver a series of talks on the song and insectivorous birds of the State as part of the curriculum of the "North Carolina Radio School" sponsored by the Department of Public Instruction and Radio Station WPTF. This is one of many means used by the Division to impress upon the children of the State the value and friendly service of our protected birds.

In spite of educational features carried out by the Division to bring this lesson to the youth of North Carolina, there is still a wide field in this line. The younger generation should not only be taught not to molest our harmless and valuable bird life, but should be induced to encourage these birds around their premises and to take a more active interest in their welfare.

2. Game Propagation. Under this heading is reported the activity of the Division, which we might term as the positive or constructive measures to increase the supply of useful wild life in North Carolina. The drain on game life is so materially heavier than previously, that it has become necessary for man to assist Nature toward supplying the demand for better hunting. The Division considers that the State Game Farm has been one of the most valuable assets of the State's game program. Aside from the definite service rendered by the farm in providing stock for release in protected covers throughout the State, its existence is justified as an educational agency.

State Game Farm. North Carolina probably established a record in game administration by the establishment of a State Game Farm within about six months following the passage of the State Law. The farm is located about two miles south of Asheboro in Randolph County on a 100-acre tract leased to the Department of Conservation and Development by the county at a nominal rental for ninety-nine years.

The first year of the last biennium, ending June 30, 1932, was most successful in the operation of the farm. The Division is now in the midst of the distribution of the game reared at the farm the current year, and therefore, a detailed report covering this year's operations cannot be made until about January 1, 1933.

Substantial improvements were made at the farm during the past two years. Grounds were landscaped, new fences were erected, and about 300 new pens were constructed to increase its capacity. Additions and improvements at the plant during the two years represent an investment of \$5,250.50.

Economies in operation of the farm affected from year to year since its establishment has reduced its cost of operations, as is shown by the financial report for this biennium. Proof of the efficiency of the farm is demonstrated by the fact that the amount of game raised, at commercial prices, has been sufficient to pay for its cost.

In distributing the game produced at the plant, the Division has adopted the policy of rotating the annual output among part of the counties each year in order to give a concentration that will allow more effective stocking.

Under this system, it is not possible to allot game to each county every year, but all receive a fair apportionment in their turn.

The following table gives the distribution from the farm for the first year (1931) of the biennium and to the end of June, 1932:

GAME DISTRIBUTION FROM FARM

Quail:

| | |
|--------------------------------------|-------|
| June 30, 1930, to June 30, 1931..... | 1,794 |
| June 30, 1931, to June 30, 1932..... | 1,043 |

Quail Eggs sent out Spring, 1931:

| | | |
|---------------------------------|----------|-------|
| Individuals receiving Eggs..... | 300 Eggs | |
| Experimental Stations..... | 1,935 " | 2,235 |
| Spring 1932, to June 30..... | | 120 |

Pheasants:

| | |
|--|--------|
| June 30, 1930, to Fall 1931..... | 1,712 |
| Fall 1931 to June 30, 1932..... | 1,553 |
| Pheasant Eggs sent out: | |
| Ringneck Pheasant Eggs sent out 1931..... | 11,232 |
| Ringneck Pheasant Eggs sent out 1932 to June 30..... | 6,868 |

Turkeys:

| | |
|--|-----|
| June 30, 1930, to June 30, 1931..... | 102 |
| June 30, 1931, to June 30, 1932..... | 66 |
| Turkey Eggs sent out: | |
| Turkey Eggs sent out 1931..... | 636 |
| Turkey Eggs sent out to June 30, 1932..... | 810 |

Native Quail Trapped March and April, 1931:

| | |
|---|--|
| 104 Trapped by Charles J. Moore and released in Beaufort County | |
| 142 Trapped by wardens and sent to game farms | |

Mexican Quail Purchased, 1931:

| | |
|---|-------------|
| 1,000 sent to Game Farm and distributed in refuges..... | \$ 1,750.00 |
| 250 sent to refuges direct..... | 437.50 |
| | <hr/> |
| | \$ 2,187.50 |

Deer Purchased—1930-31 and 32:

| | |
|------------------------------|-----------|
| 31 deer at \$25.00 each..... | \$ 775.00 |
|------------------------------|-----------|

PERMITS

Exhibition and Propagation Permits:

| | |
|---|-----|
| July 1, 1930, to December 30, 1931..... | 139 |
|---|-----|

Game Bird Propagation Licenses:

| | |
|--|----|
| January 1, 1932, to June 30, 1932..... | 62 |
|--|----|

Permits to Breed Game Animals:

| | |
|---------------------------------------|----|
| January 1, 1932 to June 30, 1932..... | 16 |
|---------------------------------------|----|

Exhibition and Educational Permits:

| | |
|--|----|
| January 1, 1932, to June 30, 1932..... | 27 |
|--|----|

Collecting and Scientific Permits:

| | |
|---|----|
| July 1, 1930, to December 30, 1931..... | 31 |
| January 1, 1932, to June 30, 1932..... | 19 |

Note. Permits are issued for calendar year.

Private Game Farms. Fully as valuable as the game actually produced and distributed by the State Game Farm is its effect in encouraging the establishment of private plants for commercial propagation of wild life. No records as to the number of commercial breeding plants in operation before the State Game Farm was established are available, but interest stimulated by the Game Law and inspiration of the State Farm has been instrumental in the development of game breeding into a substantial industry during the last few years.

Facilities of the Asheboro plant have been made fully available for study by private breeders. Scores of these have visited the State Farm for ideas in plant construction and in breeding operations. The State Law requires private breeders to purchase permits at the nominal fee of \$2 to breed game birds and \$1 to breed game animals. Permits have been taken out by the following to breed game birds:

Len Paschal, Siler City.
 Carl Phillips, Siler City.
 George Roberts, Siler City.
 Mrs. Hattie Stout, Siler City, Route 3.
 Donnie Hart, Siler City, Route 3.
 R. J. Patterson, State Road.
 G. A. Yelverton, Fremont.
 Geo. T. McArthur, Kinston.
 Dr. Wesley Taylor, Greensboro.
 Roy Smith, Randleman.
 Southland Game Farm, Morehead City.
 Douglas Spencer, Oxford.
 L. B. Poole, Currituck.
 N. F. McCulloch, Kinsey Street, Raleigh.
 W. V. Powell, Ridgecrest.
 V. D. Pruitt, Traphill.
 W. B. Davis, Currituck.
 Geo. Watson, Washington.
 Ben C. Mayo, Tarboro.
 Clarence P. Cromer, Winston-Salem.
 Mrs. O. A. Walters, Fayetteville.
 M. E. Peed, Hobucken.
 W. S. Boswood, Coinjock.
 H. I. Stevens, Rocky Mount.
 W. P. Jones, Moyock.
 E. L. Bundy, Moyock.
 L. B. Daniel, New Bern.
 W. A. Thornton, Burlington.
 Jackson Felmet, W. Asheville.
 Dr. Everett A. Lockett, Winston-Salem.
 A. G. Gordon, Winston-Salem.
 F. E. Price, Battleboro.
 R. C. Haberkern, Winston-Salem.
 F. W. Beacham, Ansonville.
 J. E. Fox, Siler City.

Dr. H. H. Fries, Tillery.
 Highland Game Farm, Moyock.
 Kendall Brothers, Guilford.
 R. W. Andrew, Sedalia.
 E. V. Floyd, Randleman.
 J. R. Frye, Franklinton.
 B. W. Tatem, Barco.
 J. J. Larew, Mocksville.
 L. Dillahunt, Kinston.
 T. E. Carpenter, Claremont.
 Jos. P. Knapp, Currituck County.
 Tom Dodson, Shelby.
 W. M. Mauney, Murphy.
 Sallie Stribling, Oakland.
 Tar Heel Game Farm, Guilford College.
 Burton H. Smith, Charlotte.
 Bray Estate, Greensboro.
 E. B. Bradley, Gastonia.
 Horse Shoe Quail and Turkey Farm, Carthage.
 Earl Kennedy, Kinston.
 M. F. Bedsworth, Davis.
 G. W. McThompson, Haw River.
 Dr. M. Szamatolski, Transylvania County.
 L. W. Steel, Mooresville.
 Mrs. Cameron Morrison, Charlotte.
 W. B. Barrow, Louisburg.
 J. E. Miller, Mocksville.
 Robt. J. Patterson, Mountain Park.
 N. C. State College Game Farm, Raleigh.
 Edgar Tufts, Lees-McRae College, Banner Elk.
 Albemarle Game Breeders Association, Pine Bluff.
 Arthur Gallop, Elizabeth City.

Game Refuges. Experiences of the Federal government and most of the States have proven that there is no more effective means of restoring wild life than by the establishment of refuge areas. North Carolina adopted such a policy early after its game law went into effect.

The State's first refuge was set aside within sixty days after the effective date of the statute, and new areas have been added steadily since that time. The refuges are divided into two classes, State and Auxiliary. The law contemplates the establishment of State refuges upon publicly-owned lands, and Auxiliary refuges on privately owned lands leased to the Department without cost as breeding grounds.

To date six State refuges and twenty-eight Auxiliary refuges have been created, four of the former being in Western North Carolina on National Forest lands; the fifth consists of State-owned land known as Holly Shelter in Eastern North Carolina; and the sixth the Hanes-Lassiter Migratory Wild Fowl Refuge.

The total area of the Western North Carolina refuges is 69,640 acres; and the Holly Shelter Refuge consists of approximately 35,000 acres, of

which about 15,000 acres have been set aside as Public Hunting Grounds. Approximately 400,000 acres surrounding the Western North Carolina refuges are available for public hunting grounds.

The refuge system has grown more rapidly in Western North Carolina largely because of the availability of huge areas of National Forest lands for such use. For the use of these lands and the active coöperation of its forces, the State is deeply indebted to the U. S. Forest Service. State refuges established on government land, their areas and the National Forests in which they are situated are as follows: Mt. Mitchell (Pisgah), 22,640 acres; Wayah Bald (Nantahala), 12,000 acres; Andrew Johnson (Pisgah), 16,000 acres; and Daniel Boone (Pisgah), 19,000 acres.

One of the most generous contributions by individuals to North Carolina's game program came from Mr. and Mrs. Robert Lassiter of Charlotte, who turned over their private hunting preserve, "Pilentary," on "the banks" of Carteret County to the State as a refuge for migratory water fowl. This area, beginning about two miles south of Portsmouth, extends approximately nine miles along the Atlantic Ocean and Core Sound. To the land surface, the Division has added a parallel strip of Core Sound approximately two miles wide, making a total area of some 20,000 acres.

The donors specified a probationary period of administration before making a decision on formally deeding the tract to the State. They expressed their readiness to the Board of Directors at their July meeting to transfer title to the refuge when given assurance by the General Assembly that the property will be dedicated permanently for public service in the manner specified, which will allow its use as a State Park to an extent consistent with protection of the wild life making the refuge its permanent home and wintering grounds. The Department feels that the Lassiters deserve unstinted praise for their generosity and exhibition of public spirit; and feels sure that the General Assembly will adopt a resolution formally accepting the property and expressing the State's appreciation of the valuable gift.

During the biennium, the U. S. Biological Survey has established a federal migratory waterfowl refuge in Hyde County. This was one of the first refuges in a system which the Federal government plans to develop, one in each State, during the next several years.

This reservation has been given the name of Swanquarter Migratory Wildfowl Refuge. Its establishment marks an important step in the preservation of the migratory waterfowl resources about which deep international concern in recent years has been loudly voiced.

Vermin Control. This subject has furnished the basis for considerable discussion even among scientific men. Some maintain that it has been over-stressed, while others take the stand that modern conditions and the inroads of hunters upon useful wildlife make it essential that efforts be made to control species that prey upon game life.

For several years, the Division has set aside a sum to be used for the payment of bounties for the predatory species outlawed under the State Game Law. The usual allotment for bounties has been \$10,000 annually, but this amount was cut in half during the first year of the biennium and

to one-quarter the last year. Increased claims for bounties quickly exhausted the available fund, the payments were suspended.

Systematic campaigns of vermin control are carried out vigorously on the various State and Auxiliary Game Refuges, since experience has proven that predatory wild life multiplies fully as fast or faster under protection than the useful species.

A most vigorous and relentless effort has been constantly made by the Department to call particular attention to the growing menace of stray cats to game and other bird life. Conservative estimates place the cat population in North Carolina at 3,000,000, of which 1,950,000 may be classed as stray felines.

Some authorities estimate that each stray cat catches at least ten pieces of game each year. At this rate, 19,000,000 birds and animals are killed each year by cats, a destruction far in excess of the combined bag of hunters. Based on returns from a census of bags of all game taken in 1928, some 4,000,000 pieces of game are killed each year by hunters, less than one-fourth the estimated annual destruction by cats. As long as this army of nocturnal hunters is allowed to kill on this scale, North Carolina cannot attain the position as a game State which is warranted by its facilities.

3. Education. As is the case with all other phases of conservation, education of the public to a proper appreciation of its game resources is fundamental. The Supreme Court of the State has classified wild life as property of all the people, and the game law represents the public's rule in dealing therewith.

The field of game education, however, goes still further than to seek a better appreciation of wild life; it endeavors to offer helpful suggestions toward building up the resource.

Although material progress is observed in all phases of the game conservation program, officials do not allow themselves to be deceived in regard to the difficulties involved. Education must be continuous and full fruits cannot be expected within a limited period. The practice of conservation involves the change of life, habits, and attitudes; new generations appear; civilization alters natural conditions; and science is constantly suggesting new solutions for old problems.

Value of Game. Probably the greatest service of wild life is its social influence. Contact with Nature obtained through hunting is one of the most invigorating of sports. It furnishes a surcease from the strained nerves and worries of every day life. The influence of wholesome recreation on thousands of hunters is felt through the fabric of our entire social order, and the sport diverts many of the unemployed from unlawful and sinful acts.

However, the actual dollar value of game deserves consideration. The 4,000,000 pieces of game taken annually in the State have a value of some \$2,000,000, as food; and the pelts of fur-bearing animals probably are worth equally as much. Together, these two values provide an income or saving of approximately \$4,000,000 annually, a sum made still more important during periods of reduced incomes, such as have been experienced during the last three years or more.

A change of the public viewpoint from one of indifference to one of concern, and constructive coöperation can, without exaggeration, multiply many times the value and service of wild life to the people of North Carolina. It is toward this goal that the State's game conservation program points the way.

North Carolina has frequently been referred to as one of the best game states in the Nation. Hundreds of non-residents come to the State each year to hunt, spending freely of their funds while so engaged. An expenditure of \$50 by every non-resident is a conservative estimate. By improved game conditions, thousands of additional visitors might be attracted. It is reasonable to presume that many of them will purchase land and make investments in the State, while others may become permanent residents. This industry will develop in proportion to progress made in the conservation program.

Visual Education. The Division recognizes the value of this educational medium, but has not yet been able to develop it to the extent warranted by its capacity for producing results.

Several years ago, a wild life motion picture was filmed in the State, and was exhibited on hundreds of occasions along with forestry and inland fisheries reels. During the biennium, fiscal conditions necessitated the discontinuance of the truck schedule, and the films which have been practically worn out from use have been stored. As soon as funds are available, this feature of the program should be reinstated.

Photographs are also effective means of teaching conservation, particularly to children. A picture can often carry a message and an object lesson which will be considerably more forceful and permanent than can be transmitted by a profusion of words. A high grade camera and adequate filing space are needed to carry on this type of program. Because of limited facilities, the Division has on frequent occasions lost opportunities to present messages to people of the State and to advertise it elsewhere.

Conservation Text. The children of North Carolina must be reached if hoped for results are to be expected in the game program. The Department has contemplated for several years the preparation of a text which would describe the natural resources of the State and teach the necessity of wise use if future generations are to enjoy the heritage which has been that of their forefathers.

Sales of a text of this nature would make it a self-liquidating investment. Funds spent in this manner would doubtless be more effective than many times the same amount spent in other ways. Early impressions on the youth of the State will pave the way and make conservation easier of realization in future years. Departmental officials have received encouragement that such a textbook might be included in the regular course of instruction in the public schools.

Fair Exhibits. One of the most popular educational features carried out each year by the Division is its exhibit of game at various fairs in the State. Fifteen of these exhibits were placed during the biennium at the State Fair, county fairs and other public meetings of a State-wide character. Thousands of visitors viewed these displays, and lingering visits and questions showed favorable impressions.

LEGISLATIVE RECOMMENDATIONS

It is generally conceded that the North Carolina Game Law is one of the most complete and well balanced laws that has ever been written into statute. It was drafted with a knowledge of the experiences of other states in carrying out game conservation programs. However, as conditions change, it will be necessary and advisable to make changes in the law. It is not the purpose of the Department to recommend extensive amendments to the present law to the consideration of the next General Assembly. However, observation and experience in administering the law as now written indicates strongly that it would be advantageous to prohibit the sale of squirrels for food purposes. In response to a strong appeal made to the Department from all sections of the State, the Board at its last meeting viewed with favor such an amendment to the law. One of the primary objectives of the game program is to prevent the commercialization of wild game life. Thinking people quickly realize that wild life cannot survive if killed for market purposes.

There have been numerous suggestions for some time in behalf of amending the game law so as to provide for the issuance of a short term, perhaps a daily permit, to non-residents. The proponents of such an amendment favor it very largely because of the belief that the receipts from the sale of licenses to non-residents would be considerably increased. Doubtless it is true that many tourists, visitors and business men from other states while in North Carolina for a day or two during the hunting period would buy a permit at a reduced cost, who will not buy a license for the whole season with an opportunity to hunt for only a day. Such a change in the law, however, can come only through legislative action, since the Board of Directors of the Department is not given power, under the provisions of the present law, to take action in connection with license requirements.

DIVISION OF INLAND FISHERIES

INLAND FISHERIES PROGRAM AND HISTORY

Although the Division of Inland Fisheries is one of the youngest units of the Department of Conservation and Development, some of its functions were being carried out several years previous to the establishment of the Department.

This phase of North Carolina's Conservation Program was taken over with the absorption of the former Fisheries Commission Board by the Department of Conservation and Development in 1927.

Under the Fisheries Commission Board the chairman had exercised general supervision over the State hatcheries, and an assistant fisheries commissioner attempted the task of enforcing regulations governing fishing along the main rivers of the State, an assignment which is manifestly impossible of efficient execution by one individual. Under this arrangement, although there was a fragmentary system of regulations governing fishing in the interior portion of North Carolina, little progress could have been expected.

Construction of State hatcheries was started under the Fisheries Commission Board in 1924, and it was the next year before the ponds were sufficiently advanced to allow the beginning of operations. An inventory of the property at the close of the 1924-26 biennium showed a total value of \$125,540 for the five major hatcheries. This inventory, however, did not include the land occupied by the hatcheries, which was donated for the purpose and estimated at that time to be worth \$16,000, which added to the original outlay brought the total value of the stations at that time to \$141,540. Numerous additions, expansions, and improvements since that time had increased the value and usefulness of the plants and have enabled them to meet more of the increasing demands for stocking purposes.

Funds for the construction of the hatcheries were obtained from an appropriation which combined these projects with a program of shell-fish planting and creation of a new inlet into Pamlico Sound.

With the merger of the former Fisheries Commission Board into the Department of Conservation and Development in 1927, the way was opened for an expansion of the efforts to preserve the rapidly diminishing stock of inland fish so far as possible under enlarged but still limited finances.

From the completion of the fish hatcheries until turned over to the Department of Conservation and Development, their cost of operation was met entirely from appropriations from the general fund. However, the opinion that the expense of the hatcheries and other efforts in behalf of better fishing should be borne by those who indulge in the sport prevailed and appropriations for that purpose were discontinued.

Expenses of operation of the hatcheries, which it has just been mentioned were first paid from direct appropriations, amounted to \$28,922 the first year; and the sum of \$28,500 was made available from the same source for the next year.

The first move to make the inland fisheries program self-supporting was the enactment of the State Angler's Act by the General Assembly of 1927. This statute, however, required licenses only of those who indulge in what was termed "sport" fishing or who used rod and reel or who fished by casting. Revenues for the first season (only part of a year) amounted to \$10,750, and for the succeeding fiscal year the collections amounted to \$16,605.

With the expiration of the fiscal year ending June 30, 1928, no further appropriations were made available and the Division of Inland Fisheries has lived on its own income from licenses since that time. In considering the efforts being made to preserve and improve fishing, the point that the program constitutes no general burden on the taxpayer but is supported entirely by those who engage in fishing, should be emphasized.

The Angler's Act was changed in 1929 to require licenses of every person who fishes in any other except the waters of his own home county. In addition, it provided for local option under which county commissioners were given the authority to extend the license provision to require licenses of every person fishing in his home county. Twenty-four counties have exercised this option and licenses are required of everyone fishing in these counties.

Under the optional clause, a county is free to exercise the privilege of extending license requirements to its own residents and to rescind such action at its pleasure. Unfortunately, for the stability of income upon which the Division must depend for operation, some of the counties have seen fit to rescind their action after placing the license requirement in effect. Obviously, subjected to such changing conditions, the Division cannot count on any definite number of counties from which this revenue may be expected, in addition to that uniformly collected throughout the State from persons who fish outside their home county and from non-residents.

Experiences under the existing license law have convinced officials of the Division of Inland Fisheries that the only stable and the fairest method of financing its program is the adoption of a uniform statute requiring licenses in a small amount of all persons who derive benefit and pleasure from fishing. The amount need not be large, in fact a nominal fee in the sum of fifty or sixty cents for resident county licenses will be amply sufficient to supply all the needs for an adequate program.

However, in view of the unsettled conditions holding sway in North Carolina and elsewhere, the Division does not recommend that legislation at this time. As conditions improve, the need for such a uniform system will be better appreciated and it is felt certain that it will finally be adopted. Any legislation of this nature should provide for graded fees, specifying as has been mentioned only a small fee for the local angler pursuing the sport in his home county; a higher charge for the State-wide privilege of fishing by residents of North Carolina; and a still higher fee for non-residents.

Administration of inland fishing programs is supported generally through the United States by the collection of anglers' licenses as the fairest and most effective method of supporting such an activity. Recent reports from the U. S. Biological Survey reveal that licences are required in forty States, the number having expanded rapidly during the last several years.

Another logical reason for a license of State-wide application is the fact that support of the inland fisheries program would be more uniform and enable additional constructive work to be undertaken in other parts of the State. Under the present set up, most of the counties where the additional license provision has been invoked are in Western North Carolina, twenty-four of which provide more than two-thirds of the revenue for the division. With a State-wide license new hatcheries which are needed for a well rounded program of restocking could be established and additional constructive measures could be inaugurated which are not possible with the present income.

Merger of the Commercial Fisheries Board with the Department of Conservation and Development in 1927 made it possible to undertake a systematic plan of inland fisheries protection whereas little more than operation of the hatcheries with funds provided through direct appropriations could be accomplished under the old set-up.

Placing of the administration of the game law under the conservation department at the same time it took over the inland fisheries gave the latter function the benefit of an organization of wardens which it would not have been possible to develop otherwise.

One of the first acts of the newly organized conservation board was the grouping of waters into "commercial" and "inland" classifications—that is the designation of waters to denote the type of fishing which might be permitted for the best interest of those who obtain their livelihood from the industry and those interested in fishing as a pastime or recreation.

Obviously, the same type of fishing such as the use of nets and seines which are most effective in the ocean and in the larger sounds is not suited to the smaller inland bodies of water where one sweep of a seine might effectively deplete the entire supply. Under different conditions, different forms of regulations and constructive administration are necessary and this fact is recognized in the classification of the State's waters.

The Board of Conservation and Development inherited the authority "to regulate, prohibit, or restrict in time, place, character, or dimensions, the use of nets, appliances, apparatus, or means employed in taking or killing fish; to regulate the seasons at which the various species of fish may be taken in the several waters of the State and to prescribe the minimum sizes of fish which may be taken in the said several waters of the State," from the Fisheries Commission Board.

Previous to the consolidation, there were only extremely limited means by which regulations of this nature could be enforced. Consequently little along this line had been undertaken; and fisheries regulations applying to waters in the interior of the State were both fragmentary or ineffective without means for their enforcement. Even in the period of the best collections from anglers' licenses, sufficient revenue was not provided to carry out a really progressive inland fisheries program.

The sole object of dedicating the fisheries resources of North Carolina to the greatest service to the largest number motivates regulations governing fishing. Any restrictions on the free use of this resource is intended only for the purpose of preventing wasteful destruction of a common inheritance,

in which every citizen of the State has a definite property interest, by a few who would deprive the majority of their share in these benefits.

Broadly, the regulations seek to prevent wholesale taking or killing of fish such as by seines, nets, traps, and otherwise in waters of restricted area such as those in the interior of the State; to establish a closed period for taking fish by any method during the spawning season; and to limit the catch to a size which will assure the maximum benefit to the angler.

Experiences of virtually every State in the nation have demonstrated to the full that nature, under the handicap of increasing erosion which releases millions of tons of silt from the hillsides and changes the character of formerly inviting fishing waters; pollution from domestic and industrial sources; a growing population of fishermen; and more ready access to the most remote fishing territory, nature cannot keep peace with the demand for "more bites," without artificial propagation and constructive assistance by other means. This is the basis upon which the inland fisheries program is established and must be carried out if a steady depletion of useful aquatic life is to be prevented.

REVIEW OF OPERATIONS

The past biennium has been a trying period with the Division of Inland Fisheries, as it has been with most individuals and public agencies. It has been a time of readjustment to conditions presented by falling income.

Revenue from anglers' licenses has decreased steadily during the two year period, but corresponding cuts in operating costs have kept the Division within its receipts. In fact, it may be pointed out with a feeling of pride that the end of the biennium found a balance of \$3,083.36, in the inland fisheries budget which has been carried over into the next fiscal year.

A comparison of collections of the reported biennium with those of the preceding period will show the extent to which the revenues of the division have been affected. For the fiscal year ending June 30, 1930, total receipts from anglers' licenses amounted to \$45,527.35; for 1931, they were \$37,452, and for 1932, they were \$29,028. Expenditures were cut from \$51,470 for the fiscal year ending June 30, 1930, to \$36,655 the following year and \$26,389 the last year of the biennium.

Decrease in license collections may be ascribed in a large measure to general financial conditions, but repeal of county license requirements also played a part. Four counties rescinded local license requirements the first year of the biennium and two more were added to the list the last year, leaving a total of twenty-four with this provision in effect at the end of the biennium. Counties which require licenses of their residents for fishing are as follows:

| | | |
|-----------|-----------|--------------|
| Alleghany | Haywood | Moore |
| Ashe | Henderson | Polk |
| Avery | Iredell | Rutherford |
| Buncombe | Jackson | Swain |
| Burke | Macon | Transylvania |
| Caldwell | McDowell | Watauga |
| Cherokee | Madison | Wilkes |
| Clay | Mitchell | Yancey |

The General Assembly of 1931 increased the fee for non-resident fishermen from \$3.10 to \$5.10. Total collections from this type of licenses were \$3,021 in 1930; \$3,196 in 1931 and \$1,380 to August 24, 1932.

Law Enforcement. Prosecutions on charges of violations of the inland fishing regulations for the biennium numbered 2,014, of which 1,090 were during the first year, and 924 the latter year. Acting under instructions not to prosecute except when the evidence appears sufficient to establish the guilt of the accused, the wardens were able to show a high percentage of convictions, with only a few released by the courts after formal charges were brought. Prosecutions for each year of the biennium passed by a wide margin those of the last year of the preceding biennium when a total of 678 was recorded.

Fines and court costs levied against defendants for the two years amounted to \$17,613.15, a considerable increase in proportion over the record of the preceding year, when they amounted to only \$5,887.43, (separate records on the prosecutions for game and inland fisheries violations were not kept for the first year of the biennium 1928-30).

In spite of conditions during which violations of most laws have increased as evidenced by a steadily growing prison population, inland fisheries regulations have fared well from the standpoint of observance. Strenuous times have doubtless presented stronger temptations for violations, but the public has shown a remarkable degree of self-restraint in the observance of these statutes, probably through a realization that they represent a sincere attempt to preserve the benefits of the sport for the future.

Changes in major regulations governing inland fishing have been few during the biennium. Those promulgated have been directed mostly toward uniformity. As a temporary expediency, the Board of Conservation and Development allowed two and three days of fishing during the uniform closed season for warm water game fishes between May 1 and June 10.

The Board of Conservation and Development has striven during the limited period in which it has had jurisdiction over this phase of conservation to develop the fairest and most equitable policy for the protection of inland fishing. One of the greatest handicaps in this endeavor has been an insistent demand, often from a small minority, for local exemptions from certain regulations. To allow any number or even a few of these requests disrupts the uniformity of the regulations, creates dissatisfaction in adjoining counties or communities, and would finally wreck the entire system. Although the Board would on occasions cheerfully comply with many of these petitions, it cannot often do so without upsetting the administration of the regulations elsewhere. Having had repeated instances of the destructive effects of exceptions to regulations, the Board strives to avoid such exemptions and to eliminate as much confusion as possible.

On the whole, the Board's policy in regulating inland fishing has been to enact measures calculated to work to the public good in the long run. At times it has found itself in error and has been quick to remedy the mistakes. As its experience increases, the system of regulations is being perfected.

Fish Propagation. Again, during the biennium for which this report is made, an increase in output of game fish from the State hatcheries has been accomplished.

The total distribution during the two-year period numbered 8,202,279 game fish, an increase of approximately two-thirds of a million over the previous biennium or in specific figures, 664,158 over the 7,538,121 of that period. The game fish output for the first year of the biennium was 3,683,330, which increased to 4,518,949 the second year.

Added to the distribution of strictly game fishes from the hatcheries are 12,000,000 striped bass (rock) produced at the coöperative State-Federal substation at Weldon, making a grand total of 20,202,279 fishes released in North Carolina waters during the last two years. Although the striped bass is taken commercially, it is also classed and taken as a game fish. Since the reopening of the Weldon unit five years ago, a substantial increase in the supply of this fish has been reported. Distribution which formerly has been confined to the Roanoke River has been expanded, with the Pamlico and Neuse Rivers receiving a share. The Roanoke River is reported by authorities to be the greatest spawning ground for this species of fish in the United States. Importance of operation of this hatchery is stressed because of the fact that the eggs purchased from the fishermen would be otherwise wasted from the viewpoint of replenishing the fish supply.

Herewith is given the record of fish distribution from the various fish hatcheries:

| MORRISON HATCHERY, Waynesville, N. C.: | 1930-31 | 1931-32 | Total |
|--|---------|-----------|-----------|
| Rainbow Trout (Fingerlings)..... | 133,500 | 243,300 | 376,800 |
| “ “ (Yearlings)..... | 35,600 | 22 450 | 58,050 |
| “ “ (Adults)..... | | 15 | 15 |
| Brook Trout (Fingerlings)..... | 663,990 | 929,500 | 1,593,490 |
| “ “ (Yearlings)..... | 405 | 25 | 430 |
| “ “ (Adults)..... | 2 | 116 | 118 |
| Totals..... | 833,497 | 1,195,406 | 2,028,903 |

| ROARING GAP HATCHERY, Roaring Gap, N. C.: | | | |
|---|-----------|---------|-----------|
| Brook Trout (Average 40% Fingerling..... | 1,075,875 | 631,375 | 1,757,250 |
| Rainbow Trout 10% Yearling..... | 143,450 | 90,850 | 234,300 |
| Loch Leven 50% Advanced Fry)..... | 215,175 | 136,275 | 351,450 |
| Totals..... | 1,434,500 | 908,500 | 2,343,000 |

| "PETE" MURPHY HATCHERY, Marion, N. C.: | | | |
|--|---------|---------|-----------|
| Rainbow Trout (Fingerlings)..... | 261,400 | 337,400 | 598,800 |
| “ “ (Yearlings)..... | | 2,500 | 2,500 |
| Bass (Fingerlings)..... | 9,100 | 6,750 | 15,850 |
| “ (Yearlings)..... | 450 | 80 | 530 |
| “ (Fry)..... | 291,000 | 85,000 | 376,000 |
| Bream (Fingerlings)..... | 34,700 | 31,500 | 66,200 |
| Brown Trout (Fingerlings)..... | | 189,394 | 189,394 |
| Totals..... | 596,650 | 652,624 | 1,249,274 |

FRANK STEDMAN HATCHERY, Fayetteville, N. C.:

| | | | | |
|-------------|--------------------|---------|---------|---------|
| Bass | (Fingerlings)..... | 97,693 | 102,925 | 200,618 |
| " | (Fry)..... | 18,500 | 6,225 | 24,725 |
| " | (Adult)..... | | 200 | 200 |
| Bream | (Fingerlings)..... | 26,300 | 25,700 | 52,000 |
| " | (Adult)..... | | 1,169 | 1,169 |
| Minnows | (For food)..... | | 13,800 | 13,800 |
| Totals..... | | 142,493 | 150,019 | 292,512 |

BOONE HATCHERY, Boone, N. C.:

| | | | | |
|-------------|-------------------|---------|-----------|-----------|
| Brook Trout | (Fingerling)..... | 111,000 | 246,000 | 357,000 |
| " " | (Fry)..... | 512,000 | 578,000 | 1,090,000 |
| Brown Trout | (Fry)..... | 15,000 | 243,000 | 258,000 |
| Totals..... | | 638,000 | 1,067,000 | 1,705,000 |

WELDON HATCHERY, Weldon, N. C.:

| | | | |
|--------------------------|------------|-----------|------------|
| Rock (Striped Bass)..... | 10,000,000 | 2,000,000 | 12,000,000 |
|--------------------------|------------|-----------|------------|

EDENTON HATCHERY, Edenton, N. C.:

| | | | | |
|-------------------|-------------------|------------|-----------|------------|
| Bream | (Fingerling)..... | 4,190 | 200 | 4,390 |
| Black Bass | (Fingerling)..... | 34,000 | 145,200 | 179,200 |
| Yellow Perch..... | | | 400,000 | 400,000 |
| Totals..... | | 38,190 | 545,400 | 583,590 |
| GRAND TOTALS..... | | 13,683,330 | 6,518,949 | 20,202,297 |

Attention is called here to the fact that one of the hatcheries in the above list, Edenton, is owned and operated by the Federal Government. The Division makes a small contribution to the operation of this hatchery and in return, the hatchery coöperates by dividing its output for distribution with the Department of Conservation and Development. The distribution given in the above table is that portion which went to fill applications made to the Department and does not include those applications filled directly by the Federal Bureau.

Mention of the fact that the Weldon striped bass station is operated co-operatively by the Department and the U. S. Bureau of Fisheries has previously been made. A number of factors contribute to wide fluctuations in output of striped bass, among these being the level of water in the Roanoke River from which the fish supplying eggs and milt are taken, and the success of fishermen in taking the brood fish.

Stream Pollution. Wastes of various descriptions, chiefly domestic and industrial, are steadily changing the character of many of North Carolina's most valuable fishing waters.

The degree of pollution of the streams varies from those saturated with wastes to such an extent that fish life has been entirely killed or where the various chemicals has so affected the flesh of the fish that it is unfit for human consumption, to those whose original purity has only been partly impaired and to others that are as yet unpolluted to any extent.

Pollution is a natural product of civilization, and its problems grow in intensity with the increase in population and the development of industries. Some of our streams now are scarcely above the dignity of open sewers, and the most discouraging feature is that these conditions are spreading.

Since these streams constitute some of the most valuable fishing waters, the problem of furnishing good fishing becomes more difficult as pollution spreads. Every stream spoiled for fish life, limits facilities for the sport and reduces the attractiveness of the country-side.

Although the Department of Health and the Department of Conservation and Development have given serious consideration to pollution, they have never been adequately equipped to deal with the situation to the extent justified for future health protection and conservation.

The problem is not such as leads to immediate solution because of the many complexities of the situation, but the longer the delay in providing facilities to check further pollution and find remedies, the more difficulties develop. It must be dealt with in such a manner as not to hamper established industries nor to check future developments; but public health, preservation of the esthetic values and fish life demand that every practicable means be used to check and correct the contamination of the State's waterways.

Pollution of our streams is a problem that deserves more than the passing interest of the State. Lack of proper attention will result only in worse conditions in the future; and the sooner a definite program is undertaken the cheaper the work that will sooner or later be vital to public welfare can be accomplished.

Fish Ponds and Nurseries. The Division of Inland Fisheries has continued its efforts to encourage the construction of fish ponds in North Carolina. Unfortunately, because of its limited facilities, it has been unable to offer a considerable amount of specific aid to property owners along this line, but it has consistently urged the development of fish ponds on every farm having proper facilities.

Particularly during the last two years has the Division urged any property owner contemplating the creation of a fish pond to start construction immediately in order to furnish employment for idle workers. Reports from various sections show that there has been an appreciable response, particularly in some counties where the movement has gained headway. Johnston County is an example of popular interest in such a movement, more than a score of these ponds having been reported as constructed in a single year during the biennium.

The Division has used every means at its command to point out the value of ponds to the land-owners, not only for the creation of additional recreational facilities, but in increasing the value of the farm and as an important source of food to vary the farm menu and to supply new food properties in which there is often a deficiency in the ordinary diet.

Continuing a policy launched several years ago, the Division holds the young fry produced at the various hatcheries as long as its means will permit. This movement was designed to obtain the most efficient stocking possible in view of the high rate of mortality to which baby fish are subjected when separated from the protected environment of the brood pond or hatching trough.

The point has been reached where most of the fry or baby fish released from the hatcheries are sent to individuals or groups equipped with rearing

ponds in which the young hopefuls can be brought to a more mature stage before being placed in their permanent homes.

Because of the cannibalistic characteristics of not only the parents but also of the more advanced of the same brood which prey upon their brethren, the problem of providing sufficient facilities for rearing the warm water species, particularly the bass, is greater than with the trouts. Difficulties in rearing the bass and other warm water fishes are greater because they cannot be manipulated by stripping as can the trout, therefore making it necessary for the young to be subjected to the cannibalistic propensities of the parents and other brood stock until removed from the ponds where they are hatched.

CONCLUSION

The needs of the Division are many, particularly if the demands of the public are met; but under existing circumstances no specific recommendations are submitted. The Division is striving to maintain the most efficient service possible within its income and will continue to do so.

Upon the minds of all, however, the Division would leave the indelible impression that the maintenance of good fishing is not a movement whose benefits are confined to a small group, and neither is it a passing whim. Fishing is a sport, or perhaps more accurately, it is a recreation in which possibly at least one-tenth of the population indulges. Pleasures of the pastime are not confined to either sex and it is not limited to age, nor to a class. The elderly matron and the freckled, barefoot boy with only a bent pin for a hook enjoy the thrills of fishing to an equal degree with the wealthy sportsman with his expensive equipment.

Observation convinces one of the fact that the number of fishermen grows more rapidly than population. Grant this logical conclusion and add to it the forces which work toward limiting the natural production of fish such as increasing pollution, change in qualities from the clear streams supporting game fish to turbid waters producing only the coarse fishes, and greater fluctuation of streams caused by deforestation; and the necessity of assisting nature in maintaining even creditable fishing is clearly evident.

Another consideration in striving to provide the maximum of constructive recreation is the decided trend toward a shorter working day and abbreviated working week. According to strong indications, the five-day week is not far distant. Fishing is one of the most constructive forms of recreation, and reasonable investments therein will pay dividends in public health, social improvements, and mental alertness through its contemplative and restful effect and the contact afforded the devotee with the outdoors and nature.

When the public realizes the true significance of the inland fisheries program, there need be no fear that it will not be properly provided for. The Division of Inland Fisheries is striving to convince the average man and woman of the worth of its program, and as the conviction grows the Division will be prepared to keep pace.

DIVISION OF MINERAL RESOURCES

HISTORY OF THE DIVISION

It is worthy of note that the first Geological Survey, by public authority in America, was established by the State of North Carolina. In 1823, an act of the General Assembly authorized the Board of Agriculture to pay the expenses of "geological excursions" for a period of years. This first work was begun by Professor Denison Olmsted, of the State University, and resulted in the publication of nine reports.

On his removal to Yale, in 1825, the Survey was continued by Dr. Elisha Mitchell, also of the State University. Dr. Mitchell published nine reports in connection with his administration.

In 1852, Dr. Ebenezer Emmons was appointed State Geologist, and during his regime twenty-two reports relating to the geology and natural history of the State were published.

On the death of Dr. Emmons, in 1866, Dr. W. C. Kerr was appointed State Geologist, and carried on the work until his death in 1885. During Dr. Kerr's administration twenty-one reports and scientific notices were published.

On the death of Professor Kerr, the Geological Survey was allowed to lapse until 1891, when it was placed on a different footing upon the establishment of the North Carolina Geological Survey and the appointment of Professor Joseph A. Holmes, of the State University, as State Geologist.

The object of this Survey, as expressed in the act of the General Assembly authorizing it, was "the thorough examination of the nature and extent of the mineral and timber resources of the State." The work of this Survey resulted in the publication of twelve bulletins, nine economic papers and seven biennial reports and thirty-seven circulars.

This Geological Survey continued its work until 1905, when the act creating it was repealed, and a new act passed by the Legislature of 1905 establishing the North Carolina Geological and Economic Survey. During this year of 1905, and until October, 1906, Dr. Joseph Hyde Pratt, State Mineralogist, was Acting State Geologist in the absence of Professor Holmes, who was in St. Louis as Chief of the Department of Mines and Metallurgy of the Louisiana Purchase Exposition. On October 29, 1906, Dr. Pratt was formally appointed State Geologist by Governor R. B. Glenn.

Dr. Pratt continued as State Geologist until March 1, 1924. During his term of office, there were issued twenty-two bulletins, forty-five economic papers, eleven circulars, five volumes and nine biennial reports.

On April 4, 1924, Brent S. Drane was appointed Director of the North Carolina Geological and Economic Survey and served until April 4, 1925. During his term of office there were issued two economic papers and one biennial report.

The General Assembly of 1925 abolished the North Carolina Geological and Economic Survey and created a North Carolina Department of Conservation and Development.

On April 4, 1925, Maj. Wm. D. Harris became Acting Director of the Department. On August 15, 1925, Major Harris resigned and Dr. Jasper L. Stuckey became Acting Director. He served until December 15, 1925, when he resigned as Acting Director of the Department of Conservation and Development. One circular was issued during his term of office.

Maj. Wade H. Phillips was appointed Director of the Department of Conservation and Development on December 15, 1925, to succeed Dr. Jasper L. Stuckey. Dr. Stuckey remained as State Geologist until November 1, 1926. H. J. Bryson was appointed Acting State Geologist November 1, 1926, under Major Phillips, Director, and was appointed State Geologist July 1, 1927. During Major Phillips' tenure of office, three bulletins, six economic papers, the first of the educational series, nine circulars, seven miscellaneous publications and two biennial reports were issued.

Major Phillips resigned as Director on March 31, 1929, and was succeeded by Col. J. W. Harrelson on April 1, 1929. H. J. Bryson was re-appointed as State Geologist on April 1, 1929. During the directorship of Col. J. W. Harrelson, one economic paper, one circular, ten miscellaneous publications and two biennial reports have been printed to date.

ACTIVITIES OF THE DIVISION

During the period, June 31, 1930, to July 1, 1932, the duties of the Division have increased somewhat due to work for the Highway Commission and to the increased interest in the mineral deposits of this State. The funds provided for the Division by the last Legislature were \$11,390, \$5,000 of which was not made available by the Budget Bureau. Due to the small appropriation, very little field work was accomplished. No funds were available for topographic and geologic mapping, underground water investigation or other similar work that would aid or promote the mineral industry.

The number of inquiries regarding mineral deposits, especially gold, has more than doubled during the past biennium. Approximately eight hundred mineral and rock specimens have been received and reported on. This is an increase of more than two hundred over the previous biennium. The work of collecting and indexing statistics of the State's mineral production has been carried on in coöperation with the U. S. Bureau of the Census.

A number of articles have been prepared for various magazines which gave considerable publicity to the mineral resources of this State. In addition to the magazine articles, several articles have been prepared for "Conservation and Industry" and for the newspapers of the State.

During the biennium, thirteen radio talks were prepared and delivered over Station WPTF. Each of these talks dealt with some phase of the mineral industry of North Carolina. In addition to these, other talks were prepared and delivered by the State Geologist to several civic clubs and to schools of the State.

Several field trips were made to the mineral producing centers of the State for the purpose of getting accurate information concerning the mineral industry as well as to investigate undeveloped mineral properties. Several reports were made covering new deposits. Below there is given briefly the activities of the various mineral industries of the State.

METALLIC MINERALS

Gold and Silver. Considerable activity has been shown in the gold mining industry during the past two years. A number of stamp mills have been built and are in operation. A ten-stamp mill has been built in Rowan County; a twenty-stamp mill in Randolph County; a ten-stamp mill in Montgomery County; a five-stamp mill in Union County; a five-stamp mill in Cabarrus County; and a ten-stamp mill in Rutherford County. A Lane mill was reconditioned and put in operation in Union County. One property is being operated hydraulically in Rutherford County. Two washing plants are in operation in Montgomery County. A number of veins carrying gold have been prospected in Stanly, Henderson, Transylvania, Rowan and Cabarrus counties. Also several placers have been investigated in Rutherford and McDowell counties.

Copper. During the latter part of 1930, the Fontana mine, in Swain County, changed hands. It is reported that the mine is being electrified at the present time. The Cullowhee mine in Jackson County operated a short time but closed when the price of copper dropped.

Tin. The tin property near Lincolnton has been investigated to considerable extent, reports submitted by engineers and the property sold recently to the American Consolidated Tin Mines, Inc. The company reports that it expects to erect a concentration plant to produce tin concentrates and mica and clay as by-products.

Chromite. Considerable prospecting has been done on the chromite deposits in Jackson and Macon counties. The prospecting has shown some very high grade ore.

Lead-Zinc. Considerable prospecting was carried on by the U. S. Smelting, Mining and Refining Company on the lead-zinc property in Haywood County. Other prospecting was done for lead and zinc in the northern end of McDowell County.

NON-METALLICS

Feldspar. North Carolina continues to produce 52 per cent of the production of the feldspar in the United States. Five feldspar grinding mills are in operation at the present time.

Mica. The State continues to lead in the production of mica. During the last biennium, one scrap mica grinding plant was built, the largest in the State, and three old plants were reopened. Two new scrap mica recovery plants were also built.

Kaolin. The most important development in the kaolin industry was the discovery of a large deposit, probably the largest ever discovered in the State, and purchase by the Carolina Kaolin Corporation. Three hundred acres have been carefully drilled, and showed high grade clay. Plans are under way for the erection of a kaolin washing plant.

Talc. During the past biennium, the production of talc more than doubled in North Carolina. The principal developments were in Cherokee and Moore counties. The capacity of the plant at Kinsey was doubled and a

new plant began operations in Moore County. The increase in production was due entirely to new uses of talc recently discovered in the various trades.

Kyanite. Considerable activity has been shown in kyanite, a new refractory mineral. Several carloads of high grade material have been shipped for the manufacture of refractory materials. A small concentrating test plant was built near Burnsville, and plans are under way for the erection of a large concentrating plant near Franklin, in Macon County.

Sillimanite. Several carloads of sillimanite were shipped from Clay County. This is the first shipment from any point in the United States. This material is similar to kyanite and is used in the manufacture of high grade refractories.

Olivine. During the past six months, several carloads of olivine have been shipped to northern consumers. This material is a refractory and it is reported that it is going to steel works where it is to be used for beds of furnaces. There is an unlimited amount of this material in North Carolina.

Monazite. Considerable interest has been shown recently in the monazite deposits of North Carolina. It was reported the first of this year that a concentrating plant would be erected near Bostic, in Rutherford County. It is doubtful, however, that this material will be produced on a large scale due to the competition from foreign countries.

STONE

Granite. Granite continues to lead in the total value of production in the mineral industry of the State. Large contracts were received by North Carolina concerns from the United States Government to be used in bridge construction and harbor and jetty work.

Marble. Probably the most outstanding development in the stone industry in North Carolina during the past year was the purchase of three quarries and the erection of a finishing plant at Marble, N. C., by the Columbia Marble Works. The company is now producing 6,000 cubic feet of marble per month.

Sandstone. Prospecting and drilling was done for sandstone in Lee County. Nothing definite has been decided as to the opening of a quarry.

WELLS

During the past biennium, one of the most important works carried on by this Division was the locating of wells for State Institutions, cities and highway prison camps. Well locations were made for the towns of Madison and Mayodan, in Rockingham County. At Madison, two wells had been drilled to a depth of 500 feet and 350, respectively, which gave approximately 40 gallons per minute. The well locations made by this Division gave 150 gallons per minute at a depth of 200 feet. At Mayodan, four wells had been drilled to depths of 350 feet, 500 feet, 500 feet and 700 feet, all of which gave only 12 gallons per minute. The well located by this

Division gave 30 gallons per minute at a depth of 400 feet. These locations saved the town several thousand dollars in the cost of drilling.

A well was located at the Negro Blind School just east of Raleigh which gave 65 gallons per minute and saved the State approximately \$1,500. Well locations were also made at Bell's Chapel School, in Chatham County, and City Ice & Fuel Company, Raleigh. Locations were also recommended for wells for prison camps for the Highway Commission in Anson, Alexander, Cabarrus, Caldwell, Catawba, Chatham, Duplin, Granville, Lenoir, Martin, Moore, Northampton, Orange, Richmond, Robeson, Warren and Wilson counties.

RECOMMENDATIONS

Due to increased interest in the gold deposits of North Carolina, information should be secured, compiled and published covering the most important gold bearing localities in this State. There has been no published information covering gold deposits of the entire State since 1892.

Reports covering the feldspar, kyanite, sillimanite, talc, olivine and beryl deposits should also be published. Requests are made almost daily for information concerning these minerals.

Also funds should be made available for the collecting of data and publishing of a geologic map of the State. Funds were appropriated for this purpose by the last Legislature (1931) but were not made available by the Budget Bureau.

The amount requested by the Division of Mineral Resources for the year 1931-1932 was \$13,050; the amount appropriated by the Legislature was \$11,390; and the amount made available by the Budget Bureau was \$5,942.50. The amount requested by the Division of Mineral Resources for the year 1932-1933 was \$13,475; the amount appropriated by the Legislature was \$11,390; and the amount made available by the Budget Bureau was \$5,942.50, which is approximately one-half the amount appropriated by the State Legislature.

DIVISION OF WATER RESOURCES AND ENGINEERING

I. INTRODUCTION

Historical Resume. The work of the Division began in the summer of 1920 with the appointment of the present Chief Engineer to conduct surveys of undeveloped water powers for the North Carolina Geological and Economic Survey, of which Colonel Joseph Hyde Pratt was Director. During the first few years thereafter, principal emphasis was placed on water power and water supply studies, as this was a period of great expansion in the development of hydro-electric properties and improvement of municipal water supplies. In connection with this work, the Division inaugurated and carried out the most extensive stream gaging program ever undertaken in any Southern State.

The great industrial expansion of the State between 1920 and 1929 created many new problems connected with the water resources of the State. It became desirable in 1926 to outline the work of the Water

TABLE 1
DISTRIBUTION BY PROJECTS OF FUNDS EXPENDED BY WATER RESOURCES
AND ENGINEERING DIVISION, 1928-1932

| Project | 1928-29 | 1929-30 | 1930-31 | 1931-32 |
|--|--------------|--------------|--------------|--------------|
| 0. General..... | \$ 4,575.00 | \$ 8,719.48 | \$ 8,193.29 | \$ 4,772.10 |
| 1. Stream Gaging—Records and Administration..... | 4,251.00 | 2,669.89 | 2,958.82 | 2,817.80 |
| 1. Stream Gaging—Coöperatively with U. S. Geological Survey..... | 19,728.00 | 11,290.62 | 10,440.55 | 8,371.30 |
| 2. Power Studies..... | 770.00 | 389.62 | 495.59 | 219.56 |
| 3. Hydrologic Investigations..... | 1,133.00 | 1,129.02 | 1,086.31 | 553.11 |
| 4. Coasts, Ports, Waterways..... | 3,920.00 | 2,487.60 | 4,636.34 | 5,490.48 |
| 5. Stream Sanitation and Conservation..... | 1,606.00 | 1,113.14 | 1,095.03 | 64.50 |
| 6. Chemical Water Analysis..... | 220.00 | 132.44 | —14.98 | 15.61 |
| 7. Drainage District Administration..... | 196.00 | 247.23 | 541.38 | ----- |
| 8. Underground Water Investigations..... | ----- | 188.44 | 3.06 | ----- |
| 9. Mapping and Surveying..... | 1,500.00 | 351.97 | 266.35 | 132.80 |
| 10. State Hydraulic Engineering..... | 308.00 | 339.35 | 513.19 | 509.36 |
| 11. Dams..... | 300.00 | 922.74 | 58.27 | ----- |
| Total..... | \$ 38,507.00 | \$ 29,981.54 | \$ 30,273.20 | \$ 22,946.62 |
| Appropriation..... | 27,340.00 | 26,358.60 | 26,639.21 | 19,760.69 |
| Coöperative and Other Receipts..... | \$ 11,167.00 | \$ 3,622.94 | \$ 3,633.99 | \$ 3,185.93 |

Resources and Engineering Division upon a project basis, considering the major more or less distinct fields of activity of the Division. The projects among which the work of the Division has been distributed, together with the extent of activity in each as measured by annual expenditures since 1928 are given in Table 1. It is shown there that State appro-

priations available for the work of the Division have decreased by \$7,580, or 28 per cent, since 1928-29.

North Carolina is the only Southern State which has created an engineering agency charged with the investigation and conservation of all phases of its water resources. New York, Pennsylvania, and New Jersey (all much more industrialized than North Carolina) are the only states east of the Mississippi to have agencies at all comparable in activities and reputation with the Water Resources and Engineering Division.

Water Resources Policy. When water resources are mentioned, the average person thinks chiefly of water power and public water supply. While the highest use of water has always been recognized by public opinion and the courts to be for a potable supply for municipal and domestic use, there are many other uses of the water resources of a state which must be taken into consideration in any wise program of conservation and development. If municipalities are to grow and industries are to flourish, there must be some economic and safe means for carrying away their wastes. Rivers form the cheapest and most frequently used channels for removal of domestic sewage and industrial waste. Such a use of a river is entirely reasonable and proper so long as the public health or interest is not adversely affected. On the other hand, both municipalities and industry require sources of pure water supply, and the public interest requires waters in which fish may live and where resort developments may be safely constructed. These diverse and proper uses of water resources present a most complex problem to any state agency attempting to consider the best interest of the public as a whole. No state has yet worked out any definite scheme satisfactorily reconciling the conflicting interest of public water supply versus waste disposal; of industrial interests versus those of the sportsman; of public welfare as opposed to private or corporate gain; or in short true conservation of the water resources by maximum judicious use for the greatest public benefit.

To evaluate these diverse uses of water in order that the State may wisely and to the best advantage plan an orderly and sound program of public welfare and industrial development requires the collection of fundamental engineering and scientific data over a period of years. To collect such data and interpret it in the public interest is the prime objective of the Water Resources and Engineering Division, and is the foundation upon which has been predicated the activities described hereafter. A sound basis has been laid, but the vital necessity of uninterrupted observations is seriously threatened by reduced funds available for even meagre routine work. A small but highly trained staff (three engineers only) has been laboriously built up, but its depletion is imminent if further reductions in funds are permitted. It is difficult to dramatize for public appreciation the normal functions of an essentially scientific agency. To protect the public, to ensure a sound and beneficial use of the water resources of the State it is essential that the members of the General Assembly and other leaders in the State appreciate the significance of the work of the Water Resources and Engineering Division, and it is with this end in view, in this time of depression, that the present report of the Division is made somewhat unusually long and detailed.

II. STREAM GAGING

In virtually all phases of water resources use, a knowledge of the day-by-day variations in the quantity of water flowing is the basis upon which must be predicated any sound procedure for allocation or development. To be of the greatest value, observations of flow must be continuous and carried on for a long period. A record of less than 10 years duration is of doubtful value; a record of 30 years is approaching a sufficiently long period to present a reasonably true picture of stream flow characteristics. In North Carolina there are only 6 records, all made on large streams, exceeding 30 years in length. Of these, one station was flooded out by a power development (Yadkin at Salisbury) and one is marred by a break of several years.

TABLE 2
STATUS OF STREAM GAGING IN NORTH CAROLINA, 1920-1932

| Year | Number Gaging Stations | Number Stations With Recorders | Number Stream Gagings Made | Amount Spent From State and Other Local Funds | Amount Spent by U. S. G. S. | Amount Spent by Other Federal Agencies† | Total |
|-----------|------------------------------|---|-------------------------------------|--|--------------------------------------|---|----------|
| 1920..... | 8 | ----- | 48 | \$ 2,815* | \$ 1,535* | ----- | \$ 4,350 |
| 1921..... | 32 | ----- | 162 | 4,650* | 2,920* | ----- | 7,570 |
| 1922..... | 25 | ----- | 94 | 5,212* | 3,050* | ----- | 8,262 |
| 1923..... | 29 | 1 | 105 | 6,920* | 3,490* | ----- | 10,410 |
| 1924..... | 36 | 4 | 143 | 11,494* | 3,875* | ----- | 15,369 |
| 1925..... | 45 | 8 | 267 | 14,763 | 3,485 | \$ 445 | 18,693 |
| 1926..... | 49 | 15 | 249 | 12,286 | 3,525* | 1,289 | 17,100 |
| 1927..... | 43 | 19 | 167 | 11,091 | 3,025* | 2,716 | 16,832 |
| 1928..... | 53 | 29 | 338 | 17,194 | 2,455* | 2,643 | 22,292 |
| 1929..... | 68 | 39 | 397 | 20,352 | 5,000* | 5,818 | 31,170 |
| 1930..... | 75 | 46 | 391 | 15,883 | 5,000 | 18,558 | 39,441 |
| 1931..... | 77 | 48 | 569 | 13,400 | 10,200 | 10,710 | 34,310 |
| 1932..... | 71 | 48 | ----- | 11,189 | 11,000 | 5,794 | 27,983 |

* Approximated.

† All Federal funds and a large part of the State funds are expended through the U. S. Geological Survey by whom most of the field work is performed. Through the Geological Survey, the Federal Government provides for expenditure within the State an amount essentially equivalent to that provided by the State.

The first objective of the Division has always been, and still is, to collect as much and as accurate data relating to stream flow as possible with available funds and due regard to other objectives. By far the largest part of the funds of the Division have each year been spent for this purpose, as will be seen from Table 1.

Table 2 presents concisely the development of stream gaging in the State since the creation of the Division in 1920. From 1920 to 1931 the number of gaging stations increased from 8 to 75, and the number equipped with recorders to produce a graphical record of stage from 1 in 1923 to 48 in 1931. In this expansion of stream gaging activities, the Division received considerable assistance from funds appropriated by the U. S. Geological

TABLE 3
CONDENSED REPORT OF STREAM GAGING OPERATIONS IN NORTH CAROLINA
June 30, 1932

| River Basin | Active Stations In Each Basin | Active Stations Equipped With Recorders | Discontinued Stations | Number of Records † Available | Average Length of Record—Years | Average Drainage Area Above Station † (Sq. Miles) | Longest Record Each Basin | |
|-------------------|-------------------------------|---|-----------------------|-------------------------------|--------------------------------|---|---------------------------|--|
| | | | | | | | Length—Years | Gaging Station |
| Roanoke..... | 4 | 4 | 5 | 9 | 6 | 2,470 | 21 | Roanoke River at Old Gaston |
| Tar..... | 3 | 1 | 1 | 4 | 7 | 1,050 | 8 | Fishing Creek at Enfield |
| Neuse..... | 11 | 6 | 5 | 16 | 4 | 324 | 7 | Flat River near Bahama |
| Cape Fear..... | 16 | 15 | 5 | 21 | 6 | 790 | 32* | Cape Fear at Fayetteville |
| Yadkin..... | 7 | 5 | 9 | 15 | 8 | 2,340 | 32 | Yadkin at Salisbury |
| Catawba..... | 2 | 1 | 15 | 17 | 3 | 255 | 10 | Linville at Branch |
| Broad..... | 3 | 3 | 5 | 8 | 4 | 188 | 7 | Second Broad at Cliffside |
| Savannah..... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Broad near Boiling Springs |
| New..... | 2 | 1 | 4 | 6 | 7 | 231 | 8 | South Fork New at Crumpler North Fork New at Crumpler |
| Watauga..... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| French Broad..... | 11 | 8 | 15 | 26 | 6 | 177 | 35* | French Broad at Asheville |

| | | | | | | | | |
|-------------------|----|----|----|-----|---------|-------|----------|------------------------|
| L. Tennessee..... | 9 | 4 | 10 | 19 | 9 | 253 | 36 | L. Tennessee at Judson |
| Hiwassee..... | 3 | 1 | 3 | 6 | 15 | 176 | 36 | Hiwassee at Murphy |
| Total..... | 71 | 49 | 77 | 147 | ----- | ----- | 232 | |
| Average..... | 5 | 3 | 6 | 11 | 7 years | 750 | 21 years | |

† Values given are approximately correct. Areas not determined as yet for some of the new stations.

* Record not continuous from date of first operation.

‡ In general records have not been counted as being available for stations in operation less than a year.

Survey, U. S. Army Engineers, municipalities, and a few of the more progressive power companies. Most of this coöperation from sources other than the U. S. Geological Survey has now ceased. Fortunately arrangements were made in 1931 whereby coöperative funds from the U. S. Geological Survey were increased, but the total available for stream gaging is now less than in any year since 1928.

The Division has, in coöperation with the U. S. Geological Survey, introduced improvements into the methods of conducting stream gaging operations. A new circular-type reinforced concrete gage well and instrument shelter has been designed, an installation of which is shown in Figure 1. Also, in coöperation with the State Highway Commission, innovations resulting in economy have been affected by incorporating gaging station wells in new bridge piers or abutments at Tarboro, Lillington and near High Point.

To be useful, stream flow records must be readily available in published form. The Division issued in 1925 a compilation of all records collected prior to 1924. New and improved methods developed in this publication have been followed by Tennessee in a more recent similar publication. Since 1928 no funds have been available for printing of collected data, and a 6-year compilation (1925-1930, inclusive) awaits publication.

It will be observed from Table 2 that the number of stations has fallen from 77 to 71 during the past year. This has been due to curtailment of funds from both State and U. S. Army sources. Additional stations will have to be dropped if further reductions are made. It is a matter of most favorable comment that E. D. Burchard, District Engineer of the U. S. Geological Survey for North Carolina, has been able to keep in operation all except 6 of the stations operated in 1931 with a reduction in total funds of \$6,327 or 18.5 per cent. He has done this only by exceptionally skillful planning, hard work, and a fore-sightedness which caused him to procure nearly complete ratings at most stations in previous years when more funds were available.

III. POWER INVESTIGATIONS

(a) *Water Power Surveys.* Between 1920 and 1925 the Division made field investigations relative to comprehensive development of an entire river for water power purposes on the Yadkin River and its tributaries in Surry and Wilkes counties (published as Economic Paper 53, 1922); on the Dan River in Stokes County; on the Deep River in Guilford, Alamance and Chatham counties (published as Economic Paper 54, 1924); on the Hiwassee River in Cherokee and Clay counties; and on the New and Watauga rivers in Ashe and Watauga counties.

(b) *Power Statistics.* The Division has compiled and published annually a review of the power situation in the State, in order that the public might be kept advised of the progressive development of the water power resources of the State and the degree of their utilization. In 1920 there was 328,600 H.P. installed in public utility hydro plants. This had increased by 193 per cent to 963,500 H.P. in 1932. The output of these plants increased from 681,000,000 Kw. hrs. in 1920 to a maximum of 2,373,000,000 Kw. hrs. in 1929, a gain of 248 per cent.

Total public utility power installed in North Carolina (hydro and fuel plants combined) increased from 720,100 H.P. in 1920 to 1,715,900 H.P. in 1932. Total output from these plants increased from 732,600 Kw. hrs. in 1920 to a maximum of 2,532,000,000 Kw. hrs. in 1929. In 1930, 1931, and 1932 the output was less than this due to the industrial depression. It is anticipated that the output in 1932 will be approximately the same as that in 1925 or 1926.

From time to time the Division has issued detailed analyses of the power situation in North Carolina and neighboring states. The outstanding position of North Carolina in power output and undeveloped water power resources has been emphasized in these publications. The last of these was "The Power Situation in the Southern Appalachian Power Province," by Thorndike Saville, published in the *Annals of the American Academy of Political and Social Science* in January, 1931.

During 1931 the Division was called on several times to furnish statistical data on power development and output to committees of the General Assembly. The State Corporation Commission has recently adopted forms for reports from public utility companies suggested to it by this Division. The Division has no authority to require public utility companies to report power data to it, and no State agency has authority to require such reports from power producing companies which are not public utilities, or from municipal power plants. Such authority should be granted to some State agency.

Reference is again made to past suggestions as to need for a State Water Power Law similar to those in most of the larger water power states. Federal encroachments upon state rights in its streams is bound to come, and will be desirable, unless the State acts to protect the interest of the public in the most beneficial use of the resources of its streams.

IV. HYDROLOGIC STUDIES

The Division has coöperated with the U. S. Geological Survey in collecting records of stream flow, with the U. S. Weather Bureau in collecting records of rainfall, and has itself undertaken the collection of data on evaporation and silting in power and water supply reservoirs. The mere collection, tabulation and publication of such data is of inestimable value to those concerned with the development, use, and conservation of the water resources of the State, and the orderly collection of such data can only be undertaken effectively by such a centralizing agency as the Water Resources Division.

However, the Division owes a greater service to State interests than that of a collecting and publication agency. Its engineers are dealing solely with the water resources of the State. They are highly specialized experts familiar with hydrological phenomena from a State-wide viewpoint. It is therefore a function of the Division to utilize and interpret the more important data which it collects. It has been successful in doing this on an increasingly effective scale, and to a degree not approached by a similar agency in any other Southern State.

Stream Flow Estimates. Requests are frequently received from other state agencies such as the State Board of Health, Highway Com-

mission, city officials, and practicing engineers, for estimates of stream flow at points where no gaging stations are maintained. The studies consequent upon supplying such estimates are often considerable, and represent an important service to State interests.

Drought Forecasts. A severe drought occurred on central and eastern North Carolina streams in 1930. Rainfall deficiency continued into 1931, and the Division undertook to keep track of the factors indicating recovery or prolongation of this drought in 1931. In July, 1931, based upon highly complex analyses of rainfall and stream flow, supplemented later by observations of ground water level in a well near Chapel Hill, the Division predicted probable drought flow conditions in September and October. This was the first attempt of any state agency in this country to predict flow conditions several months in advance. In spite of flood producing rains in July and August, 1931, the predictions of the Division were justified, and abnormally low flows occurred in the fall.

Such predictions are of great economic importance, and in coöperation with the U. S. Geological Survey which agreed to increase its funds available in the State for this purpose, a study of correlation between rainfall, ground water levels, and stream flow is now under way. Low water flow is dependent chiefly upon amount of water stored in the ground from winter and spring rains. About 20 wells are now under observation in strategic locations over the State, some being equipped with apparatus for continuously recording the water level. It is believed that as a result of such a program, it will be possible within five years to be able to predict with considerable accuracy the probable magnitude of flow on all major streams during the low water months, and to make such predictions at least two months in advance of the expected occurrence. At present, general tendencies can be predicted and at date of this writing (August 15, 1932) warnings have been issued to municipalities on the Tar River that the lowest flows of record will probably occur in September and October unless considerably greater than normal rainfall is experienced in those months. Nearly as serious conditions are anticipated on the Neuse and Roanoke rivers.

The drought studies of the Division are of great practical importance to municipal water supply and water power projects.* They have attracted nation-wide attention and are being essentially duplicated in Pennsylvania.

Rainfall Records and Studies. No publication has ever appeared dealing with distribution of rainfall over the State, or attempting to analyze rainfall phenomena as it occurs in North Carolina. The Division has spent a good deal of money and time in endeavoring to meet this need. The data now in prepared form should be published.

Evaporation Studies. The only measurements of evaporation from water surfaces in the Southern States were begun by the Division in 1928 with the installation of evaporation pans on Lake Tallassee (Yadkin River) near Badin, and on Lake Michie near Durham. Many requests for the results of these observations have been received from various sources, such

*An important contribution to these studies was presented by Chas. E. Ray, Jr., Principal Assistant Engineer of the Division in "Minimum Flow of North Carolina Streams," Journal, American Water Works Association, Vol. 24, No. 2, February, 1932.

as U. S. Army Engineers, power company officials, consulting engineers, and others. The studies are of marked economic importance in design and operation of reservoirs, and have been widely quoted in engineering reports and textbooks.

V. COASTS, PORTS, AND WATERWAYS

Coastal Studies. North Carolina has the second longest coast line of any State bordering the Atlantic Ocean, and this coast line with the great sounds behind it, is becoming of increasing importance from the standpoint of resort development, fishing industry, game propagation, and navigation. No coast line remains stable, and the changes which have taken place along the North Carolina coast within historic times are considerable and of marked commercial and economic significance.

The great value of the New Jersey coast from a resort and recreation standpoint led the State to make many scientific studies of coastal changes and to spend many millions of dollars in coast protection structures in the past twenty years. Through the activities of the Water Resources Division, North Carolina was the second state to undertake systematic observations of its coast line with a view to collecting data over a period of years to enable coast protection or inlet stabilization structures to be economically and safely built.

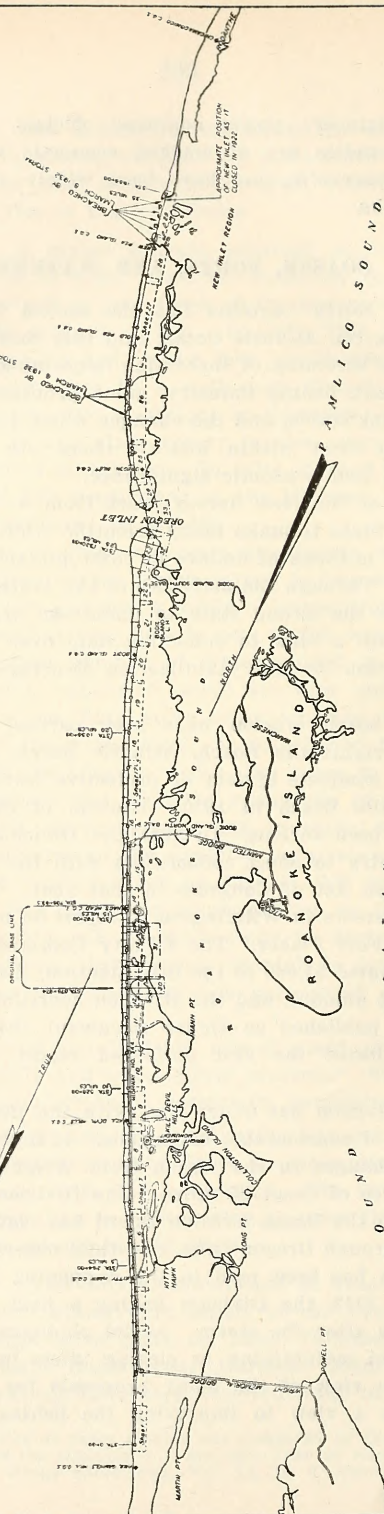
Observations of beach erosion have been carried on at Fort Fisher, Carolina Beach, Wrightsville Beach, Atlantic Beach, and Fort Macon. A report, outlining a complete system of protective works, was rendered the Town of Wrightsville Beach in 1930. Erosion of the beach at this important resort has been serious. In 1931 the Division was the first State agency in the country to effect coöperation with the U. S. Beach Erosion Board, created by an Act of Congress in that year. The Division was requested by local interests in Wilmington to report on methods of controlling serious erosion at Fort Fisher. The County Commissioners of New Hanover County contributed \$1,000 to the investigation, the U. S. Beach Erosion Board put up a like amount, and the Division contributed about \$300. The formal report was published as House Document 204, 72nd Congress, 1st Session, and constituted the first published report of the U. S. Beach Erosion Board.

At present the Division has under way with the Beach Erosion Board a coöperative project of considerable magnitude. It involves a study of coast erosion and inlet changes in the region from Wright Memorial Bridge to New Inlet, a distance of about 35 miles. The Division has made extensive ground surveys, and the Beach Erosion Board has made aerial maps, measurements of flow through Oregon Inlet, and tidal observations in the region. Particular attention has been paid to the re-opening of New Inlet by the storm of March 6, 1932, the Division having a field party at work there within a few weeks after the storm. Aerial photographs were also taken. The forces active in maintaining or closing inlets in the area are being carefully studied in view of the many proposals for cutting a new inlet in the region with a view to improving the fishing in the sounds and tributary rivers.

INDEX MAP TO COASTAL STUDY

WRIGHT MEMORIAL BRIDGE—RODANTHE REGION

A T L A N T I C O C E A N

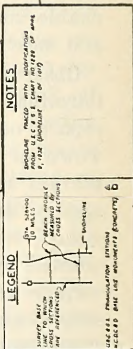


COOPERATION
STUDY BEING PROSECUTED IN COOPERATION
WITH U. S. BEACH EROSION BOARD

N. C. DEPARTMENT OF
CONSERVATION AND DEVELOPMENT
J. W. HARRISON—DIRECTOR
THURGOOD SWALLE—CHIEF ENGINEER

BEACH AND INLET CROSS SECTIONS
WRIGHT MEMORIAL BRIDGE—
RODANTHE REGION

| WATER RESOURCES AND ENGINEERING DIVISION | NUMBER | DATE | FILE |
|---|--------|------|------|
| | 4435 | 196 | 22 |



Ports and Waterways. The Division maintains a file of all reports and maps dealing with the ports and inland waterways of the State. From time to time it has presented briefs before the Rivers and Harbors Board dealing with projects in this State, and it was particularly helpful in connection with the proposed improvement of the Cape Fear River from Wilmington to Fayetteville. The Division should be the State authority to deal with engineering matters relating to port and waterway development and to advise local interests relative to port construction and waterway improvement.

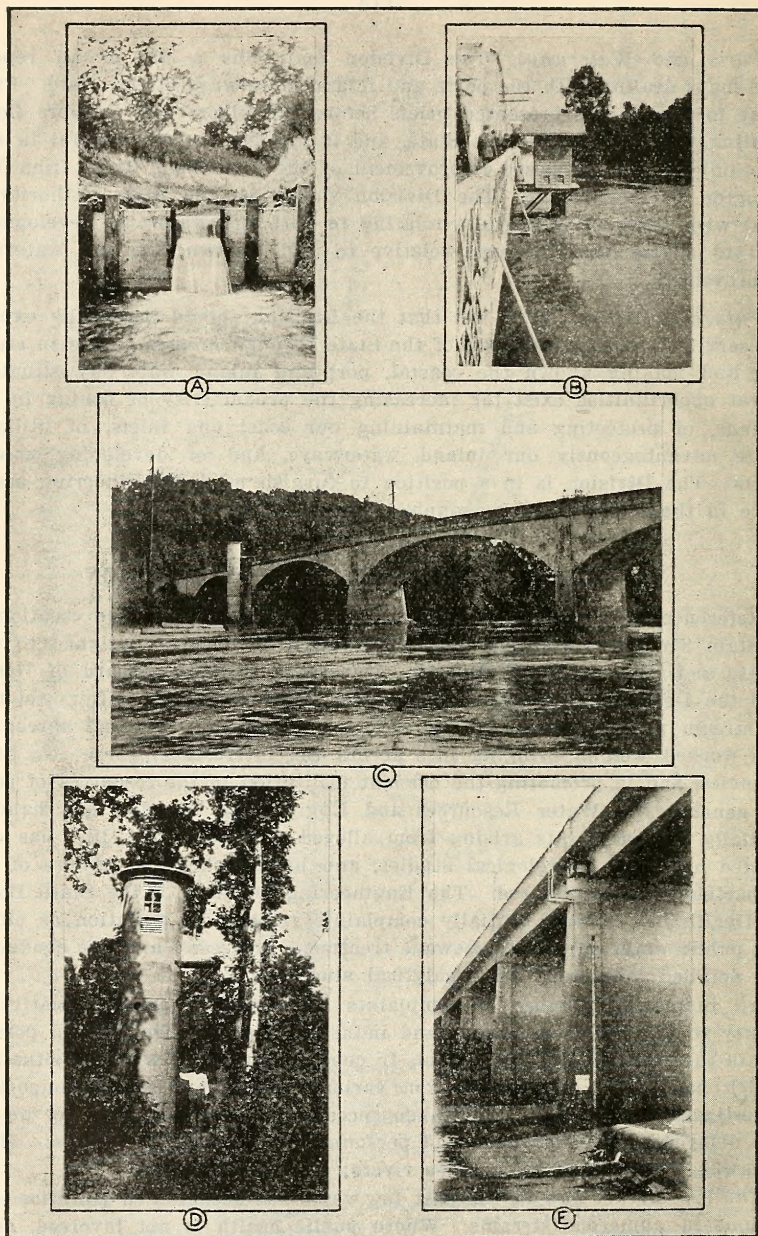
Future Activities. It is felt that the Division should materially expand its service to the eastern part of the State through greater efforts in studying and making known the coastal, port and inland waterway situation. Great opportunities exist for increasing the productivity of fishing in our sounds, of protecting and maintaining our coast and inlets, of utilizing more advantageously our inland waterways, and of developing greater ports. The Division is in a position to furnish needed engineering assistance in these matters if personnel is made available.

VI. STREAM SANITATION AND CONSERVATION

Reference was made in the last two biennial reports to the creation of a State Stream Sanitation and Conservation Committee designed to correlate and make more effective the concern of the State Board of Health and the Department of Conservation and Development in matters relating to stream pollution. During the past two years this informal agreement has worked well in bringing into accord the interests of these two State agencies, and in promoting the efficient utilization of the resources of each. In general, the Water Resources and Engineering Division has handled initially all complaints arising from alleged damage to fish life, has conducted necessary hydrological studies, and has invoked the powers of the Department when required. The Engineering Division of the State Board of Health has handled initially complaints relating to pollution as affecting public water supplies or sewage treatment processes, and has conducted the detailed laboratory and analytical studies.

An increasing number of complaints is constantly arising relative to injury to fish life from sewage and industrial wastes. The limited personnel of the Division has been unable to cope satisfactorily with the situation, which has to be approached from various angles, but several important investigations have been undertaken successfully. Projects are now active, but delayed by lack of funds and personnel, on streams as follows: Haw, Catawba, Pigeon, and Tuckasegee rivers; Contentnea Creek.

The low stream flow of the past few years has accentuated pollution conditions in numerous streams. Where public health is not involved, as it in general is not on many streams polluted by industrial wastes, the Department has jurisdiction only through its powers under the fishing laws. Numerous complaints are received, but the Division is greatly handicapped in determining actual conditions by lack of funds for employment of a trained engineering chemist and fish culturist. Part time employment of experts on the staff of educational institutions in the State would be an



ESSENTIAL BOOKKEEPING: MEASURING DAILY THE FLOW OF N. C. STREAMS

FIGURE 1. STREAM FLOW MEASURING STATIONS TO COVER FLOODS, DROUGHTS AND NORMAL FLOWS

- A. Weir measuring the flow of a small stream used as a source of water supply.
- B. Gaging Station on Cape Fear River at Fayetteville as it appeared measuring the 64-foot flood of 1929.
- C. Concrete type gaging station adjacent to bridge on French Broad River at Asheville.
- D. Gaging Station on Deep River near Moncure equipped with permanent concrete instrument house.
- E. Cape Fear River at Lillington gaging station incorporated in bridge pier through the cooperation of the State Highway Commission effecting a saving in cost.

economical and efficient way of handling the matter, but funds even for this are lacking.

Matters of stream pollution as affecting fish life involve, among other things, the following factors: (a) stream flow—whether adequate dilution is afforded at varying periods of flow; (b) time of flow—whether stream has time for recovery (usually through oxygen replenishment) between points of pollution or use; (c) chemical composition of wastes and of polluted water; (d) effect of pollution in varying degrees upon different species of fish; (e) effect of pollution upon small biological life in the stream upon which fish feed. A suggestion is made that in order to enable the Division to cope with this situation and the difficulty discussed in the previous section, funds be made available for employment of a part time industrial chemist and of a part time biologist or fish culturist. The relations of the Division with the University and State College make this proposal simple and inexpensive, due to ability to obtain expert assistance immediately at hand.*

Legislation. Attention is again called to the provisions of the Legislative Acts regarding stream pollution. Section 1899 of the Consolidated Statutes of 1919 excepts corporations chartered prior to March 1915, from prohibition against discharge of polluting substances into fishing waters. Chapter 107 of the Public Laws of 1927 excepts dyestuffs and sewage from cotton mills from prohibition against discharge into fishing waters. Under these two exceptions the Department is prevented, in case necessity should arise, from taking any steps to prevent pollution of fishing waters from the very large number of plants coming under these provisions of the Statutes. It should be stated that the industries in question have thus far evidenced a most commendable attitude of coöperation with State agencies in attempting to bring about an improved condition from deleterious wastes discharged by them. However, it is felt that these two exceptions are anachronisms, representing unfair treatment as between old and new industries, and as between special classes of industries, and they should be repealed since the State Stream Sanitation and Conservation Committee makes available an unprejudiced fact-finding State agency to administer with reason and justice all laws relating to pollution of streams. Consideration might well be given to a comprehensive stream pollution law, similar to that in effect in other states.

VII. CHEMICAL WATER ANALYSES

Knowledge relating to the chemical quality of surface and underground waters is of increasing importance in efforts to attract new industries to the State. The rayon, tanning, paper and pulp, dyeing, and bleaching, and many other processing industries which are looking to the South as offering competitive conditions for new developments require very large quantities of water of a suitable chemical quality. Such water must in general be low in color and turbidity, and essentially free from iron, magnesium, carbonates, sulphates and other dissolved substances. One of the prin-

*Dr. R. E. Coker of the Department of Zoölogy of the University has served during the past biennium in an advisory capacity on a number of stream investigations.

principal reasons for selection of a site near Asheville by the Enka Corporation was the availability of a satisfactory industrial water supply as indicated by analyses furnished by the Water Resources Division.

If North Carolina is to compete with neighboring States in presenting data to attract new industries, there must be undertaken a more thorough investigation of the chemical quality of its streams. It is believed that a good beginning could be made by a State appropriation of \$5,000 for the purpose, to be matched by a like amount from the Federal Government. An investment of this sort pays very large dividends through increased tax income from new industries, and added employment of local people.

VIII. DRAINAGE

The Drainage Acts of the State place certain responsibilities as to origination of districts upon the Department. These Acts have not been successful in preventing some unfortunate attempts in the creation of districts, nor is there proper provision for maintenance. The law places the responsibility for approval of Drainage Engineers upon the Department. What should be approved is the *plan* and not the engineer. Pending changes in the law to effect this, the Division has predicated approval of the engineer upon submission of satisfactory plans.

A thorough analysis of all existing drainage districts should be made, and engineering assistance rendered where possible. A number of amendments to the Drainage Act are recommended, giving the Department closer scrutiny over Drainage District affairs. There is no item in the present budget covering such studies or assistance, and about \$1,000 annually is needed for this purpose. Recommended amendments to the Drainage Acts provide for reimbursement to the Division for supervision in connection with new projects. During the past biennium the Division has only been able to keep in touch with drainage activities in a casual and unsatisfactory manner.

IX. UNDERGROUND WATER INVESTIGATIONS

During the past two bienniums the Division has been called upon to report on a number of well installations for State institutions. Valuable assistance has been rendered by the State Geologist.

The Division has repeatedly requested appropriations for a thorough investigation of the underground water situation in the east, where not only are such sources often the cheapest to develop for industrial or municipal use, but in some cases are the only possible source. The U. S. Geological Survey has agreed to conduct such a study in coöperation with the Division, and to bear one-half the estimated cost of \$12,000 per year for two years. It is recommended that funds for this project be provided as soon as the State is in a financial position to warrant it.

Legislation giving to the Department certain powers over well drilling operations, in the interest of conserving the ground water supply and providing data on ground water conditions is again requested. The act would be self supporting through license fees, and it has the approval of most of the well drillers of the State.

X. MAPPING AND SURVEYING

Triangulation and Leveling. The Department of Conservation and Development is indicated by Sections 9 and 18 of the Conservation Law as the official State agency charged with State-wide mapping activities, and with coöperation therein with Federal agencies. All mapping heretofore carried on by the Federal Government has been in coöperation with the Department or its predecessor. An important exception to this established procedure occurred during the present biennium.

Map Files. The Division has built up during the past few years the most complete file in existence of thoroughly indexed maps dealing with the State and its political subdivisions. This map file now includes some 1,500 separate maps and drawings. It is kept constantly up to date. An indexed file of photographs has been systematically developed to meet the needs of the Division, but has been used extensively by those looking for photographic material relating to North Carolina.

State Board of Surveys and Maps. Several State agencies have occasion to be concerned with map making or extensive usage of maps for various purposes. Among these agencies are: the Department of Agriculture, the Department of Conservation and Development, the State Highway Commission, the Corporation Commission, the Historical Commission, the Tax Commission, the State Board of Health, Park and other special commissions, and others. It is very desirable that in order to avoid duplication and to promote an orderly program of mapping best devised to serve all of the State interests there should be close coördination between all State agencies engaged or likely to be engaged, in mapping activities. To this end it is proposed that a State Board of Surveys and Maps be created, to be composed of a representative of each of the interested State agencies, with the Director of the Department of Conservation and Development as Chairman, and that Department as executive agent of the Board. This Board would consider and approve all projects for mapping on the part of any State agency. A similar Board for the Federal Government was created some years ago and has been extremely successful in preventing duplication, in promoting coördination of effort, and in standardizing procedures, all with marked increase in efficiency. Detailed outline for a similar Board to function in this State has been prepared by the Division and has the approval of the Federal Board. Its enactment into law is earnestly recommended.

Magnetic Survey. During the past year the Department coöperated with the U. S. Coast and Geodetic Survey in preparation and publication of a new and revised edition of the pamphlet entitled "Magnetic Declination in North Carolina—1930." The publication provides data whereby county surveyors and others may find monuments in every county in the State from which they may determine accurately the variation in the magnetic declination, a requisite for all correct compass surveying, this being much employed in land surveying.

XI. STATE HYDRAULIC ENGINEERING

In recent years the Division has been frequently called upon for advice and reports by other State agencies or other Divisions of the department. Various technical investigations have been made for such agencies dealing with hydrological matters. A water supply dam was constructed at the State Sanatorium, a power dam development was reviewed for Cullowhee Normal School, a report on backwater from floods was made for the Highway Commission, and estimates of minimum flow of streams receiving municipal sewage were made for the State Board of Health. So many requests of this sort are made, and the personnel of the Division is so particularly trained in handling them, that in the interests of the efficiency and elimination of duplication, it is suggested that by law the Division be made the engineering agency of the State with relation to work involving hydraulic studies, including those relating to stream conservation, power development, drainage, port and waterway improvements, coastal investigations, underground water control, allocation of water as between different uses, and all other problems involving the use or conservation of the water resources of the State.

During the past biennium the Division has carried on extensive flood control studies and construction for the State Prison at Caledonia Prison Farm. The dikes protecting this farm from inundation by the Roanoke River in flood have given trouble in recent years, and it became desirable to strengthen and extend them. About 9 miles of dike have been cleared, grubbed, brought to grade, and extended. Spur dikes have been constructed where erosion was threatening. Gages have been installed and studies will be undertaken to enable forecasts of flood heights at the farm to be made from gage readings at up-river points. This work is still in progress, and in it the Division has enjoyed the heartiest coöperation from the State Prison authorities.

XII. DAMS

During the biennium the Division has been called upon to report upon fishways in dams, to furnish designs and specifications for these, and to supervise construction. It is probable that the Division will be called upon more in the future for advice as to the construction of small dams for fish ponds and resort purposes, and for action as to inclusion of fishways in dams. The Department is now held responsible for jurisdiction relating to fishways, but statutory authority is conferred on County Commissioners and the State Department of Agriculture. It is recommended that existing laws be repealed, or amended, giving sole jurisdiction in this matter to the Department.

XIII. FINANCIAL STATEMENTS

Operations have been depicted financially in Table 1 giving the expenditure of funds by projects for each year of the current and the previous biennium. Stream gaging expenditures by the State and coöperating agencies are given in Table 2 for the period 1920-32. Expenditures for the current period are found also in the statement by divisions of the Department appearing in this report. The latter account is in terms of objects of ex-

penditure such as personal service, supplies and materials, equipment, travel expense, etc.

Attention has previously been directed to the fact that operations have been curtailed to meet budgetary requirements. The contraction is evidenced in the financial statements. An analysis of the several statements will indicate that during the current period capital expenditures have been kept at a minimum, investigational projects essentially eliminated, and printing needs allowed to accumulate. Available resources have been devoted to maintenance without undue impairment of basic activities in field and office, such as stream gaging, coastal surveys, statistical work and meeting of requests for data. Requests received and acted upon during the biennium totaled 549 of which 245 related to stream flow and 304 to work of other projects.

Table 1 indicates for 1931-32 an expenditure of \$8,371.30 for stream gaging in coöperation with the U. S. Geological Survey. This coöperation was on a contractual basis providing for equal expenditures by both parties and for that year the contract provided for expenditure of \$11,000 by each party. The amount shown in that table and also in the expense object statement represents direct expenditure other than for salaries of State employees. Services of State employees devoted to the work brought the total coöperative expenditure on the part of the State up to \$11,189. This is indicated in Table 2, which shows also a Federal expenditure within the State of \$11,000 on the part of the Geological Survey and \$5,794 on the part of other Federal agencies, the latter amount having been expended also through the Geological Survey. The total Federal expenditure exceeded that of the State by \$5,605.

XIV. GENERAL RECOMMENDATIONS

The recommendations for the next biennium are essentially the same as those contained in the last biennial report of the Division, and are as follows:

During the next fiscal biennium it is recommended that activities in stream gaging and power studies be maintained as at present. These are the two oldest activities of the Division, and have been brought to a point where relatively little increase in scope of investigations is required. Present appropriations must, however, be maintained, or vital and necessary records will be lost.

For services required by the Fisheries Division and other State agencies in connection with stream pollution studies, a part time industrial chemist and part time biologist are recommended, with moderate provision for travel. For Chemical Water Analysis, a part time industrial chemist is recommended. Travel can be cared for by coöperative funds. For these positions arrangements should be made to utilize the services of experts on the faculties of the University and State College.

For Hydrologic Investigations, State Hydraulic Engineering, Mapping and Surveying, and Stream Sanitation and Conservation projects, an additional full time assistant engineer is recommended, with provision for travel.

For Drainage District Administration, no increase is required providing the proposed amendments to the Drainage Laws are adopted.

For Coastal, Port and Waterway Studies, it is recommended that a material increase in activity be undertaken. There is a very great service to be rendered the State in the investigation and promotion of these projects as described in this report. One full time assistant engineer with provision for field assistance and travel is the minimum that should be requested.

It is urgently recommended that sufficient funds be made available for the printing of the results of important water resources and engineering investigations. Completed reports cover results of stream flow observations from 1924 to 1930, inclusive, and a comprehensive report on rainfall in North Carolina is already essentially completed and awaiting publication. Reprints of drainage laws of North Carolina are exhausted and a new issue is badly needed. Abstracts of reports on water power surveys and annual reports on the power situation should be published.

The following new legislation is recommended.

1. Repeal of exceptions of certain corporations and industries from laws governing pollution of Fishing Streams.
2. Repeal of existing statutes relating to fishways in dams, and delegation of authority in this matter to the Department.
3. Statute creating a State Board of Surveys and Maps.
4. Statute providing that the Department of Conservation and Development shall be the official State agency to furnish to all other State agencies as may be appropriate all engineering service required by them relating to surveying, hydrological investigations, navigation and port development, and studies relating to the use or regulation of the water, forest, mineral, and other natural resources of the State.
5. Law relating to drilling of wells.
6. Amendments to Drainage Act.

SUMMARY OF IMPORTANT POINTS IN BIENNIAL REPORT OF THE
N. C. DEPARTMENT OF CONSERVATION AND DEVELOPMENT
FOR THE PERIOD OF 1930-32

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A saving of almost one-fourth or approximately 27 percent was made in the expenditures of the Department in the last year of the biennium as compared with the first, the expenses having been cut from \$414,787 for 1930-31 to \$303,558 in 1931-32.

Of the \$414,787 spent the first year, only \$70,929 came from State appropriations; and of the \$303,558 used to operate the Department the second year, only \$58,752 came from appropriations.

Support of activities of the Department cost the average citizen of North Carolina from general taxes about two and one-fifth cents in 1930-31 and about one and four-fifth cents in 1931-32.

The Federal Government provided more funds than were furnished from State appropriations for the Department, \$66,708 being allotted for conservation activities in North Carolina from Federal funds during 1931-32 in comparison with \$86,752 from State appropriations for the same period.

The Federal Government furnished \$55,481 for forest fire prevention in 1931-32 in North Carolina in comparison with \$3,137 from State appropriations. The remainder of the expenditures, which totaled \$99,188 for forest prevention, came from county and private cooperation.

Only 6,946,244 of the total of 20,568,000 acres of forest lands of North Carolina were under organized protection during the last fiscal year of the biennium.

Less than one-half of one percent of the forest lands in the National Forests of North Carolina, where intensive protection is carried out, burned in 1931; 4.12 percent of State-protected forest land burned; and 11.27 percent of unprotected land burned. Landowners lost from forest fire \$4,786,225 in 1931.

Approximately \$100,000,000 can be added to the income of North Carolinians annually through the increase in the productivity of natural resources such as forest, fisheries, game and minerals, through an adequate program for conservation of these natural resources. This amount would pay the total tax bill, State and local.

Distribution of game and eggs from the State Game Farm for the biennium, through June 30, 1932, was as follows: quail, 2,837; quail eggs, 2,355; pheasants, 3,285; pheasant eggs, 18,100; wild turkeys, 168; and wild turkey eggs, 1,446.

Game fish to the number of 8,202,279 were distributed by the State Fish Hatcheries during the biennium. In addition to the game fish, 12,000,000 striped bass (rock), a commercial and game fish, hatched in cooperation with the U. S. Bureau of Fisheries at the Weldon station, were distributed.

Approximately 800 specimens of minerals and rocks, showing the increased interest in mineral development in the State, were identified for prospectors by the State Geologist during the biennium. This number was about 200 greater than during the previous biennium.

A temporary organization of Commercial fishermen and dealers, which it is hoped will be made permanent, was formed during the biennium at the call of the Department. The purpose of this group is to help solve the problems of the industry, particularly that of expansion of markets.

The Department has consistently carried on a campaign seeking to promote the development of a diversified industry in North Carolina. A definite trend in this direction was noted during the biennium. Of 102 new industries recorded as having been established in 1931, 28 were classified as food processing plants; 15, textiles other than hosiery; 12, hosiery; 8, furniture; 7 chemicals and drugs; 5 clothing; and the rest, miscellaneous.

North Carolina was the first State to receive cooperation from the U. S. Beach Erosion Board in its studies of the causes and effects of beach erosion on physical improvements, navigation, commercial fisheries, migratory bird life, and other factors.

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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF LAND MANAGEMENT
WASHINGTON, D. C.

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A review of the expenditures of the Department for the year 1931-32, the expenditures of the Department for the year 1930-31, and the expenditures of the Department for the year 1929-30, shows that the expenditures of the Department for the year 1931-32 were \$1,000,000 more than for the year 1930-31, and \$2,000,000 more than for the year 1929-30.

Of the \$1,000,000 increase in expenditures for the year 1931-32, \$500,000 was for the purchase of land, and \$500,000 was for the maintenance of the land.

Support of activities of the Department for the year 1931-32 was \$1,000,000 more than for the year 1930-31, and \$2,000,000 more than for the year 1929-30.

The Federal Government provided for the year 1931-32 \$1,000,000 more than for the year 1930-31, and \$2,000,000 more than for the year 1929-30.

The Federal Government provided for the year 1931-32 \$1,000,000 more than for the year 1930-31, and \$2,000,000 more than for the year 1929-30.

Only \$1,000,000 of the total of \$1,000,000 for the year 1931-32 was for the purchase of land, and \$500,000 was for the maintenance of the land.

Less than one-half of one percent of the land of the United States is now under the protection of the Federal Government, and the Federal Government is now spending \$1,000,000 more than for the year 1930-31, and \$2,000,000 more than for the year 1929-30.

Approximately \$1,000,000,000 is now being spent annually for the purchase of land, and the Federal Government is now spending \$1,000,000 more than for the year 1930-31, and \$2,000,000 more than for the year 1929-30.

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